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Notes of the Month

INTERNATIONAL COTTON CALIBRATION STANDARDS COMMITTEE

THE International Cotton Calibration Standards Committee met at Bremen, Germany, on May 16. It was the first meeting of the committee in Europe since its programme of work—sponsored by the International Federation of Cotton and Allied Textile Industries, the American Cotton Shippers' Association, the American Cotton Manufacturers' Institute, the National Cotton Council of America and the United States Department of Agriculture—was initiated in the early part of 1957. The committee is composed of two representatives from each of the five sponsoring organisations. The principal function of the International Cotton Calibration Standards Committee Programme is to make available calibration cottons for which standard test values have been established for various fibre properties. By use of these cottons a fibre testing laboratory can obtain reproducible results by (*a*) direct calibration or mechanical adjustment of its instruments, or by (*b*) bringing its level of testing to a standard level either by controlling the performance of operators or by applying adjustment factors to test values on the basis of controlled tests carried out simultaneously on the calibration cottons. A secondary function of the committee is to provide periodically purchasers of the calibration cottons with unknown check samples of ginned lint for testing. The purpose of the check test programme is to provide a means of evaluating the effectiveness of the calibration programme in establishing a uniform level of testing and to provide basic data for helping to establish practical tolerances for routine and commercial test results.

The establishment and operation of this programme has made possible the practical inauguration of arbitration laboratories for use in the arbitration of U.S. cotton for micronaire fineness. Several of the European cotton associations are having their laboratories certified for arbitration purposes. The calibration cottons will provide these laboratories with the means for controlling their level of testing. The calibration standards to be made available under this programme eventually cover the entire scale of micronaire values and an adequate range of values of fibre bundle tensile strength. Three American Upland and one Egyptian standard calibration cottons are currently available, ranging in micronaire value from 3·4 to 5·5. Two additional calibration cottons will be available within the next two months. These new standards are (*a*) an immature Egyptian type cotton having micronaire value of about 3·0 and (*b*) a coarse Asiatic cotton with a micronaire value of about 7·3. Samples representing these two bales have been forwarded to the designated laboratories to determine the standard test values for these cottons. The European members of the International Federation requested at the meeting that four additional standards be made available, to cover adequately the entire scale of measurement of micronaire values. These four cottons will have micronaire values of approximately 2·5, 4·0, 5·0 and 6·4. The committee requested that USDA proceed immediately to obtain material for these new proposed standards.

It was reported to the committee by representatives of the United States Department of Agriculture, which has responsibility for the operation of the programme, that over 400 laboratories located in 31 countries have purchased over 2,500 calibration standards within the last three years. It was also reported that participation in the semi-annual check test programme has expanded significantly, from 110 laboratories reporting micronaire test results for check test No. 1 to 222 laboratories reporting test results for check test No. 6. This same general trend applies to the Pressley fibre test results reported by the participating laboratories. An analysis of the check test results indicates that rapid progress has been made by participating laboratories in improving their level of testing. For check test No. 1, 78% of the laboratories reporting results for micronaire were within acceptable limits as compared with 93·5 for check test No. 6.

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PROGRESS IN THE JUTE INDUSTRY

LATEST information on the industrial progress of the Dundee jute textile industry is given by the British Jute Trade Federal Council. The use of new machinery and the adoption of new management methods is reflected in the productivity figures during the last 10 years. On the yarn spinning side, output per worker in the period has risen by 61%. Only 3% of "old-type" spinning machinery is now operating in the industry. Overall productivity in the industry—spinning, weaving and finishing—has risen by 40% in the 10-year period. Nearly half of the weaving looms are now automatic. In the modernisation programme of the industry, a total of £11·5 million has been spent in Dundee alone on re-equipment—£9·3 million on machinery and equipment and £2·2 million on buildings. Outstanding commitments on capital expenditure at the beginning of the year were already over £500,000.

The programme, which set out to remodel the industry, was undertaken to raise quality, to lower production costs, and to make working conditions attractive to labour. Redeployment and work study have been carried out in the industry to a degree unusual in this country. It is claimed that the jute industry was the first in Great Britain to introduce (in 1952) a wages structure based on job evaluation. A scheme for inter-firm comparisons of productivity, still a novelty in this country, has been run since 1955 as a stimulus to effort. To make fuller use of

new machinery, there has been a steady increase in shift working. More than half of the total output is now produced on shift systems. An investigation at the beginning of this year also showed that about 90% of existing machinery was being utilised. The net running expenses for welfare and personnel during 1959 were 47% more than the average annual expenditure in the post-war period. The total number of employees in the jute industry is approximately 18,000.

PREVIEW TO COTTON 1961

STAGED by the Cotton Board Colour Design and Style Centre, Manchester at Park Lane House, 45 Park Lane, London, W.1, this was the second exhibition designed, as part of the Board's home trade promotion campaign, to review—well in advance of the normal fabric showings—the main trends which will appear in British cotton apparel fabrics for the following year. All the major trends illustrated in last year's exhibition "This is Cotton 1960" became part of the immensely varied presentation of British cotton fashion through the making-up trade and through piece-goods departments. This exhibition confirmed the industry's increasing range of fabrics for both men's and women's trades and put forward a number of significant design trends.

To confirm cotton's position as warm weather town wear, a new range of abstract prints was shown. The industry has been considerably assisted—during 1959 and this year—in the development of more subtle, subdued town prints by the weather, which increased and speeded up the acceptance of cotton as an elegant town fabric. The abstract prints were shown largely in close tones of muted colours. Greys, beiges, soft blue-greys and caramels were most important. The fabrics were sometimes textured, but most important were the soft handling, soft finishes. The abstracted florals retained cotton's traditional interest in floral themes, developed with tonal subtlety in new town shades. Muted greys and beiges were extended into new tones with greens and yellows, and fashionable chestnuts and golds. Texture weaves were softer handling and subtle; tonal town styles appeared on new lightweights. Blues used together with greens in particular, extended the tonal subtlety into a more brilliant range. Two new print themes were introduced, one an extension of the subtle colourings and the abstracted florals of the town cotton theme, a second, a direct contrast with it. Moonlit florals, widely spaced with a free, water-colour appearance, had something of the quality of the abstracts but were widely spaced on white and tinted grounds. The tonality of the abstracted florals was still there through the shading of the original brush strokes in the print. These may be brilliantly coloured, in greens and blues or new mauves with subtle sages defined by black for summer evening wear, or in soft, muted pinks, yellows and lilacs for "sweet pea" coloured summer dresses.

The chintz look prints were a direct reaction to the abstract designs. Sometimes bold, sometimes finely drawn, usually with black to define, they were often careful florals on lawns, crimps, teenage and lingerie cottons. Lilacs and muted pinks were strongest. The liveliest colour among the more conventional cotton dress fabrics was a clear, sharp blue. Violets and lilacs continued, pinks and yellows gained strength. For the beach, the exhibition combined fabrics for the men's and the women's trades. Many of the colours and designs were bolder statements of the themes in the high fashion cottons. The Paisley style was subtly coloured, ranging from tie-silk type designs in greys and sages to neat patternings, finishing in bold borders. Many of these fabrics had the restraint and subtlety of colouring likely to be important in men's beach wear as well as the freshness required for crisp summer dresses. For beach wear there were prints on the new, softer textures—but generally the effect of texture was achieved in the drawing of the design rather than in the character of the cloth. The fabrics designed for men alone were confined largely to town and country shirtings. They showed an extension of last year's interest in woven effects but colour was being subtly introduced, particularly browns and yellows in satin stripe effects. The important, subtly coloured tie prints were remarked on and here the weight of the cloth was frequently lighter, as well. The exhibition included nearly 200 fabrics representing the production of 56 cotton houses.

General view showing the Abstracts for Town Wear section. The model on the left featured Ascher's grey and white Paisley printed cotton voile. The model in the centre was dressed in Roha's abstract check cotton satin in brown and grey

A general view. In the foreground the large scale Beach Blues section, included prints on the new, softer textures. In the background were the Chintz Look prints including designs on lawns, crimps, teenage and lingerie cottons

Diagnosis of Troubles in Polyphase Motors

Possible causes of trouble can arise from unbalanced voltages, break in motor circuit, overheating due to overload or incorrect voltage, overheating of rotor, etc. The technique for open circuit, short circuit and earth fault testing is explained

By "ENGINEER-IN-CHARGE"

MOST electric motors used in industry are polyphase squirrel-cage or slip-ring induction motors. When trouble is experienced with such machines it is often of assistance if a preliminary check is made by means of an ammeter and voltmeter. For this purpose a "clip-on" type of ammeter is very useful. An ohmmeter is also useful for resistance measurement.

In the event of a motor humming, but failing to start on load when switched on, two possible causes are overload or low voltage, the starting torque being practically proportional to voltage.[2] If overload is suspected the load should be removed if possible and the motor tried out again. Due to the starting current of induction motors normally being much greater than the full-load current the voltage at the motor terminals will ordinarily be somewhat less than the rated supply voltage during starting. Thus, if low voltage is suspected, it is advisable to test the voltage on the supply side of the starter with the motor switched off.

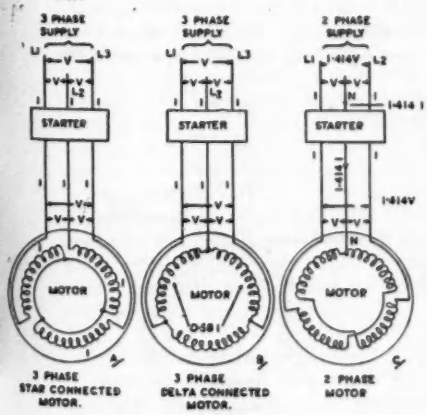


Fig. 1. Normal voltage and current conditions in 3-phase and 2-phase motors

As indicated in Fig. 1*a* the voltage between each pair of supply lines L_1 to L_2, L_1 to L_3 and L_2 to L_3 should be equal, and approximately equal to the rated supply voltage. Fig. 1*c* shows that the voltages V between either phase line and neutral, L_1 to N, and L_2 to N, should be equal and approximately equal to the rated voltage of the supply, but the voltage between the phase lines L_1 to L_2 should be 1·414 of this value. If the voltage ratio is correct, but the values are appreciably lower than normal, low voltage may be preventing starting. The cause might be a supply fault, or the use of the wrong tappings on the supply transformer.

Open-circuited Line Will Prevent Starting

If no voltage is indicated to one supply terminal of the starter an open circuit on the supply to the starter is indicated. This might occur due to a melted fuse, faulty connection or loose contact at a switch or fuse, or a fused cable. It should be noted that the correct voltages may be indicated between each phase and neutral if there is an open circuit coupled with a short circuit between two phase conductors, but in this case the correct voltages will not be indicated between all the phases. The location of the open circuit may be found by means of a voltmeter, since the correct voltages will be shown on the supply side of the open circuit.

Starting Troubles Due to Unbalanced Voltages

On the other hand if the three-phase voltages at the supply terminals of the starter are unequal, or two-phase voltages are not in the correct ratio, the trouble may be unbalanced supply. This might occur due to single-phase loads on the system not being equally distributed between the phases and neutral; or high volt drop at one point, as might result from a faulty contact or connection at a switch or fuse, or to an open circuit, in the supply to a distribution point through which is fed another polyphase motor which is running.

For instance if the motor A in Fig. 2 is running when an open circuit occurs at the point X it is quite possible that it would continue to run; in which case three-phase voltages would be induced at its terminals and passed through the distribution fuse box to the supply terminals of the other two starters, although V_1 and V_2 would differ somewhat from V. Under these conditions the motors B and C would probably be self starting when switched on. A clip-on ammeter could be used to locate such an open circuit, since no current would be indicated in the

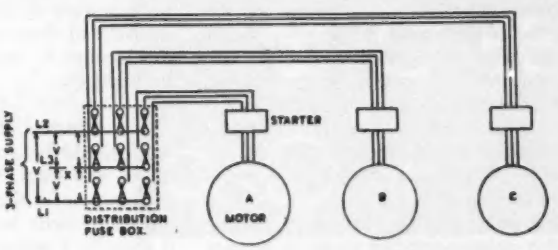


Fig. 2. A 3-phase motor circuit under single-phasing conditions

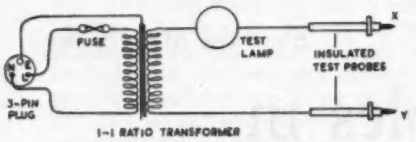


Fig. 3. A simple test circuit

open-circuited line immediately on the supply side of the open circuit.

Break in Motor Circuit

If the motor refuses to start with the correct voltages at the supply terminals of the starter it may be that there is an open circuit in the starter or in the cables between the motor and starter. It may be possible to make a check by quickly clipping the ammeter round each cable between the motor and starter, after switching on the starter into the starting position. The currents in a three-phase motor circuit should be equal, as indicated in Fig. 1*a* and 1*b*; but the neutral current of a two-phase motor should be 141% of that in the two-phase lines, as in Fig. 1*c*.

Open Circuit Testing

If there is no current in one cable between a motor and its starter this points to an open circuit in the starter, which might be due to a faulty contact or connection, in the cables between the motor and starter, or in one phase of the stator windings of a two-phase motor or a star-connected three-phase motor. In this case, if the starter appears in order, further tests may be made with the simple test circuit shown in Fig. 3. This utilises a small transformer of one-to-one ratio which is fed from the single-phase supply. With the outgoing cables disconnected at the starter the test-lamp circuit may be plugged in and the test probes applied between pairs of these outgoing cables in turn. If the test lamp fails to light in each case an open circuit in the cables, or in the stator windings of the motor, is indicated. However, in the case of a star-delta starter, as in Fig. 4, the test lamp should normally light only when applied between A and A_1, B and B_1 or between C and C_1. If the correct test lamp indications are not given at the starter the tests should be repeated at the corresponding terminals of the motor. If the correct indications are not obtained at the motor an open circuit in the stator windings is indicated, otherwise the cables themselves are likely to be at fault.

In the case of a three-phase motor with delta-connected stator windings, as in Fig. 1*b*, if there are equal currents in two cables between the motor and starter with a much higher current in the third cable, there is likely to be an open circuit in one phase of the stator windings.

Short Circuit Testing

Other causes of the currents in a three-phase motor circuit not being equal, or currents in a two-phase motor circuit not being in the correct 1 to 1·414 ratio, are a short circuit in the motor circuit or an earth fault. In case of short circuit the overload releases or fuses will probably have operated when an attempt was made to start the motor; there would probably be a smell of burning and possibly the emission of smoke. An earth fault might have similar results, although this is not certain. A short circuit would be indicated if the measured resistances between the outgoing terminals of the starter of a three-phase motor were unequal (the resistances of each phase of the windings if a star-delta starter is used), or the resistance between each phase and neutral of a two-phase motor was not equal. An ohmmeter may be used for such measurements.

Open Circuit and Earth Fault Testing

It may also be noted that in the event of an open circuit in one phase of star-connected three-phase motor windings, or two-phase stator windings, there will be a very high resistance between two pairs of stator terminals. If there is an open circuit in one phase of delta-connected three-phase stator windings the resistance between two pairs of the stator terminals will be equal, with double this resistance between the other pair of terminals. To check for an earth fault the starter should be isolated from the supply and held in the closed position, whilst one test probe of the set shown in Fig. 3 is held in contact with the earthed casing of the starter and the other probe is held in contact with one of the main terminals of the starter. If an earth fault is indicated by the lighting of the test lamp, the various parts of the motor circuit may be isolated from each other, by disconnection if necessary, and tested individually.

Rotor Circuit Faults

It should be noted that a slip-ring motor will hum, but not start, when switched on, if the rotor is completely open circuited; but this is only likely if there is a serious fault in the rotor starter, such as the resistors burnt out, or the brushes have been left off the slip rings of the motor. If a slip-ring motor starter is tripped out immediately an attempt is made to start up it may be that the rotor is short circuited. This might result from the rotor starter, or the slip-ring short-circuiting gear on the motor (if fitted) being in the running position. If there are indications of a rotor short circuit not due to these faults the stator switch may be closed after raising the brushes from the slip rings. If the motor then attempts to start there is a short circuit on the rotor windings or slip rings.

Overheating Due to Overload

Many faults cause more or less gradual overheating of a motor when running. Modern motors are designed to operate safely at quite high temperatures. In case of doubt, therefore, it is advisable to measure the temperature of the motor windings, or the cores in contact with the windings, by means of a thermometer. Table 1 gives the maximum permissible temperature-rise above ambient temperature for various classes of insulation. If the class of insulation is not marked on the machine it should be taken as being Class A. In the event of the ambient temperature exceeding 40°C. the permissible temperatue-rise should be correspondingly reduced, to limit the maximum temperature of the windings. The cause of high motor temperature should be investigated and removed.

Table 1. Maximum safe temperature-rise limits for various classes of insulation on motor windings

Class of insulation	Maximum permissible temperature-rise of windings and core as measured by thermometer
A	55°C.
E	65°C.
B	75°C.
F	95°C.
H	115°C.

Mechanical overload causes overheating. This may be suspected if the

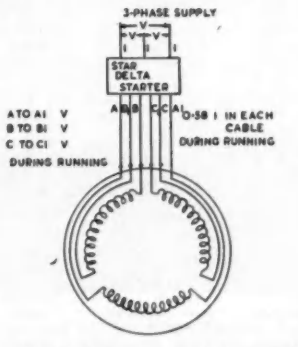


Fig. 4. Normal running conditions with a 3-phase motor and a star delta starter

Table 2. Approximate full-load currents of typical polyphase motors

Rated horse power	Full-load current of Two-phase motors at						Full-load current of Three-phase motors at					
	200 volts		220 volts		400 volts		400 volts		415 volts		500 volts	
¼	1·6 amps		1·5 amps		0·8 amps		0·9 amps		0·9 amps		0.75 amps	
1	3	"	2·75	"	1·5	"	1·75	"	1·7	"	1·4	"
2	6	"	5·5	"	3	"	3·5	"	3·4	"	2·75	"
3	9	"	8	"	4·5	"	5	"	4·8	"	4	"
4	11	"	10	"	5·5	"	7	"	6·3	"	5	"
5	14	"	13	"	7	"	8	"	7·7	"	6·5	"
6	16	"	15	"	8	"	9·5	"	9·2	"	7·5	"
7	19	"	17	"	9·5	"	11	"	10·6	"	8·5	"
7½	19·5	"	18	"	10	"	11·5	"	11·1	"	9	"
8	21	"	19	"	10·5	"	12	"	11·6	"	9·5	"
9	24	"	21	"	12	"	13·5	"	13	"	11	"
10	26	"	24	"	13	"	15·5	"	14·9	"	12	"
12	30	"	28	"	15	"	17·5	"	16·8	"	14	"
12½	32	"	29	"	16	"	18·5	"	18	"	15	"
15	38	"	35	"	19	"	21·5	"	20·6	"	17	"
20	49	"	44	"	25	"	28	"	27	"	22	"
25	61	"	56	"	31	"	35	"	34	"	28	"
30	73	"	66	"	36	"	42	"	41	"	33	"
35	86	"	78	"	43	"	50	"	48	"	39	"
40	98	"	88	"	49	"	57	"	55	"	44	"
45	110	"	100	"	55	"	63	"	63	"	50	"
50	119	"	108	"	59	"	68	"	66	"	55	"
55	131	"	119	"	65	"	76	"	73	"	60	"
60	143	"	130	"	71	"	83	"	80	"	66	"
65	158	"	139	"	79	"	88	"	85	"	71	"
70	165	"	150	"	82	"	95	"	92	"	76	"
75	172	"	157	"	86	"	100	"	96	"	79	"
80	184	"	167	"	92	"	106	"	102	"	84	"
85	193	"	176	"	96	"	111	"	107	"	89	"
90	199	"	182	"	99	"	115	"	111	"	92	"
95	210	"	192	"	105	"	122	"	118	"	97	"
100	227	"	202	"	111	"	128	"	124	"	102	"

motor currents are more than the rated value, with equal currents in the case of a three-phase motor. It may be suspected if the phase line currents to a two-phase motor are more than rated value, with the neutral current 141% of the phase-line current. If the rated current is not marked on the motor reference may be made to Table 2.

Overheating Due to Incorrect Voltage

However a similar increase of current, with overheating of the motor, will also occur if the voltage is wrong, even though the motor is not overloaded. The motor voltage might be too high due to the wrong transformer tappings being used. It is more likely to be low, in which case it might be that there is an excessive volt drop on the cables due to them being too small. This would be indicated if the voltage at the supply terminals of the starter, with the starter off, was appreciably more than that at the motor terminals when the machine was running on load.

If a motor overheats with normal currents the cause is probably faulty ventilation due to an accumulation of foreign matter on or in the motor, the motor being in a confined space, in a hot-air pocket near a roof, or the motor being heated by radiation from a nearby source of heat. However, the same effects may be obtained if the motor has been left running with the starter in the starting position.

Overheating of Rotor

However the rotor of a motor may overheat with normal line currents if there is an open circuit in the rotor, although this would probably be indicated by periodic fluctuation of the stator currents. An open circuit in a slip-ring rotor may be checked by clipping the ammeter round each cable between the rotor starter and the running motor in turn, after making sure that the slip-ring short-circuiting gear (if fitted) is in the starting position. There will be no current in one of these cables if there is an open circuit. The cause might be a faulty contact in the rotor starter, a brush not making proper contact with its slip ring, or an open circuit in the rotor winding. The latter fault would be indicated by a voltmeter applied between each pair of slip rings, after closing the stator switch with the brushes raised clear of the slip rings. There will be no voltage between two pairs of rings if there is an open circuit. Unequal voltages may indicate a short circuit in the rotor.

Break in the Primary Circuit

If the line currents to a three-phase motor starter are unequal, or the currents to a two-phase motor are not in the correct ratio, the cause may be unequal voltages. If the voltages are incorrect there may be a supply fault, unbalanced single-phase loads, or an open circuit to a distribution point, as described previously. If there is no current in one supply line to the motor this indicates an open circuit in the supply to that particular motor/or, if it is a star-connected three-phase motor or a two-phase motor, an open circuit in one phase of the stator windings. Equal current in two supply lines to a delta-connected three-phase motor, with a much higher current in the third line, indicates an open circuit in one phase of its windings. If the open circuit is in the stator windings themselves the correct voltage will be present at the motor terminals.

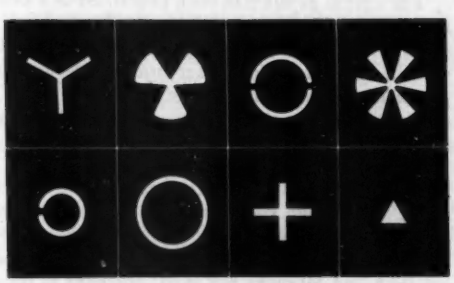
Unequal currents to a three-phase motor, or unequal currents in the two-phase lines to a two-phase motor, may also result from a short circuit or an earth fault. Methods of detecting these two types of faults have been described previously.

Shaped Aperture Spinning Jets

THE introduction of spinning jets designed to produce a variety of unconventional fibre cross-sections has added a new parameter to the manufacture of synthetic fabrics. By the use of such jets, the characteristics of synthetic fabrics may be readily modified, more especially in appearance, bulk, resistance to creasing, apparent water absorption and wearing properties.

Johnson, Matthey and Co. Ltd. have developed a technique for producing shaped aperture spinning jets, some examples of which are shown in the illustration, in any of the stainless alloys normally used by the industry as well as in a high-hardness heat-resisting steel. Jets produced in this latter material are characterised by their long spinning life, highly polished exit faces and resistance to scratching during gathering and normal handling.

This new technique yields close reproducibility of aperture shape and of cross-sectional area from hole to hole. In addition, capillary lengths are also closely controlled. Further information and recommendations on hole design can be obtained on application to the company.



A selection from the Shaped aperture spinning jets made by Johnson, Matthey and Co. Ltd.

Mixture Fabrics

Descriptions of a wide range of mixture cloths including wool/silk, viscose and acetate mixtures, cotton/wool, wool/linen, wool/jute, etc., with yarn counts, end and picks and weave

By W. MIDDLEBROOK

THE combination of silk and wool makes a real quality cloth that can be woven in a silk loom or a Yorkshire dress-goods loom when the warp is of silk. The only alteration may lie in the shuttles, which need to be larger for wool than for silk or cotton. An open, gauze weave is used to make *barrége*, with silk warp and wool weft, though cotton imitations are sometimes made, again with wool weft; the material is used for head coverings at religious ceremonies. Another gauze fabric is *Spanish crepe* or *crepe d'espagne*, where a crepe silk warp is used for crepe effect, and *gauze flannel* is a light striped tropical shirting of silk and wool. *Étamines* is a voile-like fabric of gauze or network that may be of silk/wool, the name being French for bunting or sifting cloth.

Minstrel cloth is a crepe dress fabric with a two-fold spun silk warp and two-fold worsted weft of "S" and "Z" twist. *Crepe marocain* is a dress and lining fabric with the weft much thicker than the warp, may be of silk and wool. *Estrella* is another plain weave dress fabric of the silk/wool marocain style, with "S" and "Z" twist in the weft. *Marocain* is a plain weave fabric with crepe yarns, the highest qualities being of silk warp and wool weft, though rayon and cotton may be used in cheaper qualities. *Epinghue crepon* is a dress fabric with organzine silk warp and pick-and-pick weft of wool and silk alternately, ornamented by Jacquard designs on a repp ground.

Barçan is a heavy ribbed fabric once made in Holland, with a three-fold warp of silk and goats' hair and a three-fold weft of Angora wool. A similar fabric is *baraçan*, also known as *percan*, a weft-rib cloth with silk warp and goats' hair weft. Another heavy corded or ribbed fabric of silk/wool is *armuré laine* or "wool armure." *Crystals* is a dress fabric of fine silk and wool, with alternate fine and coarse ribs and cords, and another fabric with large and small ribs alternating is *épingle*, made wholly of silk, or with cotton or worsted weft. *Épingle brocade* is a dress fabric with a white silk warp and coloured wool weft, brocaded with jacquard figures.

The cotton *poplin* has been described as a fabric with fine ribs across the piece, with the ends per inch double the picks. The French term for this cloth is *popeline*, and this may be made with silk warp and coarse wool weft. *Terry poplin* is a silk/worsted fabric where the warp weaves one end plain and one end terry, creating tiny loops over the cloth face. *Moiré poplin* is a watered cloth of silk/wool with a poplin plain weave. *Moiré mille fleurs* has, as the name suggests, small floral effects printed on a poplin-type fabric with grège silk warp and worsted weft. *Eolienne*, a plain dress fabric, uses a gummed silk warp and hard-twisted botany weft to get the same poplin effect, 100 ends per inch and 50 picks per inch; the gum is removed in the finishing process. Another poplin that may be wholly of silk, or with worsted weft, is *buratine*. A *bengaline* is a silk fabric that may have the poplin cords of silk, cotton or wool.

Cashmere silk is a twill fabric, a thick and soft material with a five- or eight-shaft twill weave, a silk warp and worsted weft. Other twills include *fayetta*, another soft silk dress fabric with worsted weft, 80×100, 100 den. warp and 84s weft. *Henrietta* is a fine silk and botany dress material with a 1×2 weft twill and a soft, lustrous finish; *Jockey cloth* is another super-grade cashmere with a 3-end weft face twill, two-fold silk warp and botany weft. *Laburnam* is a light dress fabric with a 2×1 warp face twill, silk/worsted. *Lansdowne* is another 2×1 silk warp faced twill with worsted weft, of high quality, and *mayo dress fabrics*, that may be of cotton, worsted or silk warp and botany weft, with a mayo twill weave as shown at Fig. 55. *Épengline* has a silk warp and merino weft, with a serge twill weave. Satin fabrics include *diobiris*, a mixture cloth with a five-shaft satin weave, silk warp and wool or rayon weft. *Satin grenadine* is an eight-shaft weave dress fabric with a high lustre, of silk/worsted, or with mercerised cotton weft, and *satin feutré*, another fine dress fabric with an eight-shaft weave, organizine warp and worsted weft; *feutré* means "felt."

Other dress fabrics include *borrel*, a light material of silk with rough wool weft. *Duvetyn* is a "mouse-skin" fabric with a plain weave that may have spun silk warp and wool weft, slightly napped in the finishing process, and *ferrandine*, a plain silk/worsted or silk/cotton dress material. *Fleeced mozambique* is a high-quality dress fabric with a short, fleecy nap on the face, of silk and two-fold worsted, with an extra warp beam of low-grade silk which floats on the face and is sheared after weaving. *Marble silk* is a silk/wool dress fabric with a mottled surface to imitate marble, the effect being produced by multi-coloured weft. *Barathea* may be made in a twill hopsack weave with silk warp and fine botany weft for dress wear. *Biretz* is a reversible silk/wool fabric with a corded weave on one side and a twill weave on the other. *Bombazine*, already described as a silk fabric, may also be made with a silk warp and botany weft. *Gloria cloth* has also been described as a cotton or silk/cotton umbrella cloth, and this may also be made with wool weft on a 3×1 twill weave. *Mummy cloth*, a black crepe-style mourning fabric, may be of silk/wool. *Silk warp flannel* is a high quality fabric of silk/wool with a loose weave for shawls and infant wear.

Wool and Silk Mixtures

Convent cloth is a light dress crepe, usually black, of wool and silk; another fine dress fabric with botany warp and silk weft is *cord de chine*, and *zephyr silk barège* also, of

worsted and silk. A brocaded dress fabric with both warp and weft end and end of worsted and silk is called *pochonne double cloth*. *Coburg*, with a cashmere twill weave, may be made of worsted/silk. *Crepe de santa* is an open-weave underwear fabric of natural wool warp and undyed silk weft. Vestings or waistcoat fabrics include *brightons*, a woollen cloth with a Brighton weave as shown at Fig. 56, and ornamented by spots of silk or rayon, and *cassenette*, a wool/silk jacquard fabric also ornamented with small spots or figures, in this case on a twill ground.

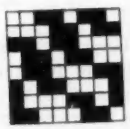


Fig. 55. Mayto twill weave

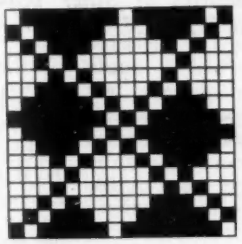


Fig. 56. Brighton weave

Miscellaneous Mixture Fabrics

Rayon is used with natural yarns in many fabrics, as weft, or mixed and blended in the spinning process. Cotton and rayon fabrics include *asticot canvas*, a dress material ornamented by slubs in warp and weft forming small spots, one example being 68×50, 32s cotton warp and 150 den. rayon weft; *asticot* is the French for "gentle or maggot," a translation that may not seem so far-fetched when it is remembered that *chenille* really means a caterpillar. *Benares* is a furnishing fabric, brocaded, with a cotton warp and 1×1 cotton and rayon weft; another furnishing fabric is *catania*, again brocaded, with a two-fold cotton striped warp and gold rayon weft. *Electric stripes*, as the name implies, are also striped, a cotton/rayon dress fabric 76×72, 2/80s warp and 150 den. weft; empty dents are left at intervals, the rayon weft floating over the spaces to form lustrous or "electric" stripes. *Pyjama stripes*, too, may be of cotton/rayon. *Polonaise lining* may be of cotton/rayon, with a twill weave, one example being 100×100, 52s cotton and 150s rayon, or with silk/rayon in a 5-end satin weave. *Métalline* is an imitation metal cloth for millinery and trimmings, one example being 76×120, 2/80s super Egyptian cotton and 100 den. viscose weft; this fabric also is sometimes made with a silk warp and rayon weft. A true *metal cloth* is a cotton or silk fabric combined with threads of copper, silver or gold. *Shots* are lining fabrics with warp and weft of contrasting colours, with cotton warp and rayon weft.

A cotton stripe warp with viscose weft, plain weave, is used to make *jaspe cloth*, one quality being 50×50, 24s/150 den. Another striped fabric is *crystalline*, a light, muslin-type dress material of cotton with rayon stripes. *China mull* also is a light dress fabric with a plain weave, a soft material of cotton and rayon or silk. *Croisé silks*, 3-end twill linings, are sometimes made with cotton and rayon. Other mixture fabrics with a cotton warp include *acid-proof fabric*, where nitrated cotton yarn is used with asbestos, glass or other mineral fibres to make filters for electrolytic work. *Baline* is a coarse lining or upholstery fabric of 5s cotton warp and horsehair weft. *Étamines* is a coarse sifting fabric of gauze that may be made of cotton and linen. *Linenette* is an inferior linen fabric of cotton and flax, and *shamrock lawn*, another fabric of cotton and flax with a fine plain weave.

Cotton weft is used with flax to make *basin*, a linen fabric with a twill weave, and *Belgian ticking*, a satin-faced upholstery and bedding fabric. *Bataloni* is of hemp, with cotton weft. *Sport satin* is of rayon and cotton, with a warp-face satin weave, 84×60, 150 den. rayon and 32s cotton. *Taffetas alpaca* is sometimes of rayon/cotton, and *droguet lisère* or "bordered drugget" may also be made of rayon and cotton.

Wool weft is used with flax for *ballanges*, a plain weave dress fabric that may also be wholly of wool. *Drugget*, a furnishing fabric used as a protector for carpets, is a coarse fabric with linen warp and wool weft, though jute or coarse cotton may also be used. *Linsey*, named after the town in Suffolk where it was first made, is a strong, hard-wearing fabric worn by the country folk of that day, a striped or coloured material with linen warp and worsted weft. *Linsey-wolsey* is made with a 4-end twill weave, again for rough wear, with a linen warp and wool weft. It is classed as a "woollen linsey" because the weft-face twill weave brings the wool to the face, which has a nap finish. *Rechèrché satin*—"elegant satin"—is a rayon/worsted dress fabric, with a rayon face and crepe finish.

Horse cloth is a heavy jute fabric, sometimes wool-backed, with a twill weave; really a horse blanket. Flax weft is used with a silk warp in *taffetine*, a coat and dress lining fabric that may be cheapened by having cotton weft. *Bed ticks*, coloured stripe fabrics of twill or sateen weave, may be made with cotton warp and linen or flax weft. *Celalinen* is a fine fabric with linen warp and rayon weft, plain weave. *Empress gauze* is another fine cloth, a figured fabric with a silk ground and linen flower figures in a satin weave. *Lamé cloth*, a brocaded tinsel fabric used for dance frocks, shoes and furnishings, has a tinsel warp that may be shot with tram silk, cotton or rayon weft. *Hongkong cloth* is a silk/ramie mixture, a clothing fabric with a plain weave. *Droguet* is a furnishing fabric with brocaded figures in coloured schappe silk, the organzine warp being shot with cotton or rayon. *Canton crepe* is usually of silk, but may be made with rayon weft, a heavy coarse cloth with a plain weave and crepe weft of "S" and "Z" twists. *Angel skin* or *peau d'ange* is a satin dress fabric with a rayon warp and schappe silk weft, one quality being 350×100, 75 den. rayon and 2/200s schappe. *Royal*, a tie cloth, may be wholly of silk, but is sometimes made with grège silk warp and rayon weft.

European Jute Interests Confer in Scotland

Thirteen countries were represented at a meeting, June 28 - July 1, of the management committee of the European Jute Association, Gleneagles. They were France, W. Germany, Holland, Belgium, Italy, Spain, Austria, Switzerland, Portugal, Denmark, Norway and Sweden.

The U.K. industry was represented at the meeting as observers by Dundee's Association of Jute Spinners and Manufacturers, led by Mr. Lewis F. Robertson. The others were Sir William G. N. Walker and Mr. D. L. Urquhart. Mr. R. C. Carmichel (France) (president of the European Association) led discussions on questions dealing with the supply and price of raw material, shipping freights, problems arising out of the Common market, the European Free Trade Association and low-cost Asian imports. This was the first time the Association had held their meeting in the U.K. Last year it was held in Stockholm and before that (1958) in Brussels, when their triennial congress took place. Jute manufacturing industries in the U.K. and the Continent account for approximately 25% of world production. The largest industry is the U.K., followed by France, W. Germany, Belgium and Spain.

Textile Institute Jubilee Conference

Papers on fibre science, textile mathematics, technology and management, employment, clothing, fashion and design were given at the recent jubilee conference, officially opened by the Earl of Derby (President of the Institute) and held this year in London, May 30 - June 3. Summaries of other papers will appear in August "T.M."

The Chemistry of Protein Fibres

THE fifty years which had elapsed since the foundation of the Textile Institute might be described as the golden age of fibre science, said Professor J. B. Speakman (Department of Textile Industries, University of Leeds). During this period there had been a succession of advances along three main fronts: X-ray examination of the fine structure of the chief natural fibres, physio-chemical studies of polymerisation processes and the properties of high polymers, and the development and use of the new chromatographic techniques for the amino-acid analysis of protein fibres. All sections of the textile industry had benefited from these developments and some, notably the synthetic-fibre industries, were based on them, but recent rapid advances in protein chemistry would hardly have been possible without the invention of the powerful technique of paper chromatography.

In this paper chief attention was given to silk and wool. Silk was considered first—not merely because its constitution was less complex than that of wool—but rather because the main principle underlying recent rapid progress in determining the sequence of amino-acids in fibroin should provide a basis for similar work on keratin.

"In order to study the composition of fibroin it has been necessary first to carry out a complete amino-acid analysis and then to study the amino-acid sequence in the crystalline regions of fibroin. The simple relationship between the composition of fibroin and its elastic properties is readily understood if the more easily extended, disordered regions of fibroin are rich in the amino-acids with long side-chains, while the well-oriented polypeptide chains in the crystalline regions consist of alternating residues of glycine and alanine or serine. A very close understanding of the crystalline regions of fibroin has been obtained and further investigations on fractions of fibroin isolated by means of other enzymes are likely before long to provide a complete understanding of the constitution of the silk molecule. The present tentative picture is that the chain molecules of fibroin, having a molecular weight of 84,000, consist of alternate sections with average molecular weights of 4,000 and 3,000, the former giving the crystalline regions and the latter the amorphous regions."

"From its earliest days, wool research has been complicated by bewildering variations in composition within and between wools. More recent research has done nothing to lessen the confusion; in ignorance of this more recent evidence of the extreme heterogeneity of wool, the early research workers did, however, succeed in establishing a rational interpretation of old processes, as well as in developing new ones, by focusing attention on the features which were common to all wools instead of on the differences between them."

"The skeleton structure which was so fruitful of results over a period of about 25 years was proposed on the basis of X-ray and physio-chemical studies of the fine structure of the wool fibre. Advances which have been made on the basis of this concept have included the study of intramolecular reactions, particularly of the setting of the strained fibres in steam, boiling water, and boiling solutions of various reagents which assisted setting. Advancing knowledge of the chemical mechanism of permanent set has been paralleled by an increasing number of practical applications of the reactions. Among the more recent of the developments are methods for imparting permanent creases and pleats, a permanent lustre, and washable seersucker effects to all-wool fabrics. In addition, early recognition of the importance of cross-linking reactions in setting processes led to a general study of cross-linking reactions in keratin."

"Usefulness of the skeleton model is gradually being exhausted, however, and further advances must be based on more precise knowledge of the proteins which are present in keratin and the arrangement of amino-acids in them. Chromatographic techniques have been used to obtain complete amino-acid analyses of typical wools. These, however, are limited in value because the results represent merely average values for the wide range of proteins present in the fibre. At one stage it was realised that studies of amino-acid sequence were likely to be unprofitable because of the extreme heterogeneity of wool and there began a series of attempts to separate keratin into its component proteins by dissolution and fractional precipitation."

"There is a definite need for a new approach if precise relationships between structure and properties are to be established. One such approach is based on differences of accessibility of the crystalline and amorphous regions of the fibre. Methods of this kind should provide the more exact knowledge of the constitution of keratin which is needed to inaugurate a new era in wool research."

Expansion for Uganda Textiles

Uganda Development Corporation Ltd. is to embark on an expansion plan costing £1,000,000 to increase the production of the Nyanza Textile Industry factory at Jinja, says a Barclays Bank D.C.O. message from Kampala. Last year the factory produced nearly 13 million yards of textiles.

T.I. Jubilee Conference

Some Aspects of Fibre Physics

A TEXTILE fabric differed from other forms of matter by virtue of its softness, flexibility, porosity, elasticity and great strength, said Professor R. Meredith (Royal College of Science and Technology, Glasgow). These physical properties were attributes which went a long way to explain why a textile industry existed at all. His paper was mainly concerned with those aspects of fibre physics which described and explained the properties and behaviour of fibres in relation to their physical environment, i.e., their reaction to stresses and strains, moisture and heat.

Discussing the significance of measurements of fibre dimensions, density, optical, electrical, thermal, and mechanical properties, Professor Meredith said the density of fibres was a physical property related to fibre structure; it was useful as an aid to identification and analysis and was a factor to be considered in relation to the bulk density of textiles. An example of the application of accurate density measurements was in the determination of the change in density from skin to core in viscose rayon. A knowledge of density variations within a fibre was useful in relation to dyeing. The refractive index of a fibre could be used to give information about the internal structure of fibres, e.g., degree of molecular orientation, and the application of interference microscopy enabled very small differences in refractive index to be accurately measured.

In recent years there had been several investigations of electrical properties of textiles. These properties were of interest not only from the fundamental viewpoint of understanding the behaviour of materials but also from the practical aspect of using yarns and fabrics for electrical insulation and in the electronic measurement of moisture content and yarn irregularity. A knowledge of the power factor of fibrous materials had assumed some importance with the advent of drying by high-frequency dielectric heating. Other investigations had been concerned with the occurrence of static charges, which lead to many troubles in processing and use, especially with some of the man-made fibres. It had now been established that the amount of static charge generated in any process was largely independent of the nature of the fibre or its moisture content, and that static charges were lost by two processes: a conduction process and a radiation process, so that a simple measure of resistance was not a sufficient test of anti-static properties.

The properties of most textile fibres were affected by heat and moisture: one of the consequences of absorption of moisture by fibres was the liberation of heat, and work on this had led to an understanding of the important thermostatic action of hygroscopic textile fibres when used for clothing. Not only did a hygroscopic fibre produce heat on absorbing moisture, but it also produced a thermostatic action by delaying the propagation of a temperature change through the mass of the fibre.

Mechanical properties of fibres had been studied in great detail because of their obvious importance in both the processing and use of textiles. The author considered that strain and modulus were of more fundamental importance than stress and quoted examples in support of this contention. Resilience was an important characteristic of good textile fibres. This involved a time effect which depended on internal friction. Recent studies of dynamic modulus and internal friction of fibres in tension, in bending and in torsion had enabled the purely elastic and the time dependent viscous components of fibre deformation to be separated and their significance under different conditions to be assessed.

Experimental techniques had been developed to determine stress-strain relations at very high rates of extension and, apart from their intrinsic interest, the results had application in the field of personnel armour, safety lines and climbing ropes. Many of the simple relations between the different physical properties of fibres had been arrived at only after much painstaking experimental research. Every year new tools were being perfected for the physical investigation of fibres, e.g., radioactive tracer techniques, and potential new fibres were being produced by the chemists, as also were modifications to the older natural fibres, so that the textile physicist was likely to be kept busy for some time to come.

Society of Dyers and Colourists

Dyeing Piecegoods Made from Polyester Fibre and Wool Blends

"THE development of textiles manufactured from modern synthetic fibres often took different ways in various countries. This was particularly true with polyester fibres: 'Dacron' in the U.S.A., 'Terylene' in England, and 'Trevira' in Germany were good examples. Nevertheless, practical experience gained in this and other countries may help to solve pressing problems," stated Dr. J. Nusslein (Farbwerke Hoechst AG) when he recently delivered a lecture to the Huddersfield Section of the Society of Dyers and Colourists, on "Some Aspects of Dyeing and Finishing Piecegoods of Polyester Fibres and Wool." "In Germany," he said, "ladies' dress goods of 8-10 ozs. in a mixture of 55% polyester fibre and 45% wool had been in great demand during the last two years. Union dyed shades, particularly heavy shades were favoured by fashion, but presented a number of serious difficulties. Some of them could be solved, but others still presented problems to the dyer and finisher. The same situation applied to men's wear, but happily the ratio of piece dyed articles compared with production in multi-colour was far smaller. Complaints of dyers and finishers were concentrated on uneven dyeing, coloured spots, varying density, width and weight, varying handle of finished goods, and

insufficient resistance against creasing and piling.

Dyeing, of course, raised several problems: choice of the most suitable dyestuffs, carriers, dyeing techniques and, of course, machinery. The best way Farbwerke Hoechst AG found was the selection of a particularly suitable range which included products of various dyestuff makers. Careful investigation showed that one of the reasons for difficulties in dyeing proper was the presence of lubricating oils, loom oils, and spinning oils that were difficult to scour out. Many such oils were already difficult to remove from wool and these difficulties were increased when dealing with polyester fabrics or blends. When dyeing wool with acid or chrome dyestuffs, small fat residues distributed evenly over the goods were of little significance, but they did play an important part in dyeing with disperse dyestuffs, since these were soluble in oil and therefore caused staining. If such oils were not completely washed out, agglomeration easily occurred during dyeing, drops were precipitated on to the goods, leading to unevenness and spot formation. Badly distributed carrier could intensify these effects considerably, to say nothing of the disastrous results resulting from thick drops of oil which occasionally came from the machine bearings.

It was possible to tackle at least part of the problem by the following ways:—

(A) Commercial spinning oils were systematically tested, and in collaboration with the manufacturers of these spinning oils, types were developed that could be easily washed out.

(B) Unsuitable types were clearly named and an intensive information campaign was conducted among combers and spinners.

(C) The washing process was improved and many customers today carry out a double washing.

(D) Greatest care was taken in the maintenance of machinery, particularly dyeing apparatus.

Dr. Nusslein then said there was a good chance of improving the situation by cleaning these articles with organic solvents. The advantages were as follows: Any type of spinning oil could be used, spinning technological factors being the sole criterion. Every type of oil stain could be removed irrespective of where or when it occurred. Finishing before dyeing was quicker and cheaper, the cumbersome spotting could be omitted and there were less spoiled goods. No damage to the wool fibre was detected using this treatment, he said, and small amounts of anti-static preparation such as Leomin PE or Leomin K added to the solvent were to be recommended to prevent dust flying on to the goods. As a stripping agent the carrier Remol TRF was used in the presence of ammonia and combined with hydrosulfite.

A particular problem was heat-setting. In Germany a vigorous thermo-fixing process is considered essential for 45-55% blends. By this method a better handle and maximum crease resistance are achieved, together with a comparatively low pilling degree. There were difficulties met at several places and careful analyses were showing that not all thermosetting machines are giving the same results even when run at the same temperature and having the goods running at the same speed.

It was, therefore, necessary to check this type of machine very carefully.

Dimensional changes in the goods, the square-yard weight variation during dyeing and the development of handle were other cumbersome problems. An investigation into these showed that when ortho phenyl phenol was used in a dispersed form—varying the quantities of the carrier and the dyeing time—more time and a larger amount of carrier increased shrinkage and reduced the fine original handle of the material. The results are shown in the following table:—

	UNDYED								
Remol Carrier/TRF	1	2	3	4	5	6	7	8	9
	4	4	8	8	-	4	4	8	8
time	4	8	4	8	8	2	6	4	8
weight/m²	200	225	239	245	214	220	225	244	274 g.

(Weight of the untreated material: 200 g.)

Conclusions from this test may be clearly drawn in theory but it is difficult to exploit practically these results.

The problem of costs was also very serious. At the moment there were comparative tests being carried out between the carrier dyeing, high temperature dyeing and padding heat-setting methods. High temperature dyeing was becoming more popular in Germany, although the results were not altogether satisfactory yet. So far as consumption of dyestuffs was concerned the heat-setting methods were by far the most economic, and remains to be seen whether the continuous processes recently offered, would lead to consistent practical good results."

New Type Rotary Joint

A COMPREHENSIVE range of redesigned rotary joints has been developed by Weston-Evans and Co. Ltd., Clifton, near Manchester. This range is intended to augment and gradually replace their existing range where heating or cooling media is applied to rotating drums, shells or bowls. Joints can be supplied in duplex (steam feed and condensate outlet in one joint) or single type (one joint for steam feed and one for condensate outlet).

The seal or joint faces consist of a stationary Ni-resist nose casting, mounted in the port casting, and sealed off by heat-resisting rubber ring pressurised by phosphor bronze gland ring and robust spring, and a rotating graphite ring secured into a recess at the end of the rotating steel spindle screwed into the cylinder at bowl end. Undesirable rotational tendencies are obviated by the introduction of an anti-torsion device, and the spindle is mounted on ball bearings thus minimising radial friction. Graphite provides the lubricant to prevent extensive friction at the rotary seal, the faces being held together by spring pressure in addition to heating or cooling media pressure. It is stated that during development tests, one of these joints effected a million revolutions at a speed of 500 r.p.m. passing steam at 60 p.s.i.g. with a resultant total face wear of ·0015 in.

Standard joints operate to a maximum of 160 p.s.i.g. and a maximum of 600 r.p.m.

New rotary joint for drying, setting and cooling cylinders (Weston-Evans and Co. Ltd.)

The following advantages are claimed for this rotary joint: (*a*) automatic compensation for wear and expansion; (*b*) absolute minimum of frictional resistance to rotation, and (*c*) lubrication for ball bearings by "Exol" high temperature grease specifically developed for this application. The rotary joints are manufactured in various specifications of stainless steel for anti-corrosive applications.

Scottish Tweed Exports

A 20% rise in Scottish tweed exports during the first three months of this year compared with the similar period of 1959 was announced recently by the National Association of Scottish Woollen Manufacturers. Overseas deliveries totalling 2,680,000 sq. yds. represented more than half the industry's total production of 5,285,000 sq. yds. during the quarter. The U.S. was again the industry's best customer accounting for 56% of all exports. Mr. C. J. Ballantyne, president of the Association commented: "It should be borne in mind that these exports to the United States reflect the tremendous efforts made by Scottish manufacturers to deliver as much cloth as possible before the exhaustion of the American tariff quota. We cannot expect to keep on shipping tweed to the U.S. at this rate during the whole of 1960." Sales to other parts of the world increased also, a notable success being achieved in Western Europe where sales rose from 371,000 sq. yds. in the first three months of 1959 to 470,000 in the first quarter of this year—almost 22% of all exports.

Textile Mill Maintenance

Operational features of fluid drives, points to observe in mill installations, also information on rotary and straight-line drives. Factors affecting valves are discussed with suggestions for maintaining maximum efficiency

By F. H. SLADE, A.M.I.MECH.E.

HYDROKINETIC drive, better known as fluidrive, offers advantageous application to textile processing. For example, incorporated in the drive to ringframes and similar machines, it gives smooth starting, simplicity of controls, and stepless speed variation to achieve optimum spinning rate. Fluid couplings of the traction type are also employed to provide the smooth acceleration required in the operation of worsted spinning frames. With container speeds up to 15,500 r.p.m., accelerating periods of up to 50 secs. are involved. The rate of accelerating to cater for these conditions is readily adjustable by varying the quantity of oil in the coupling.

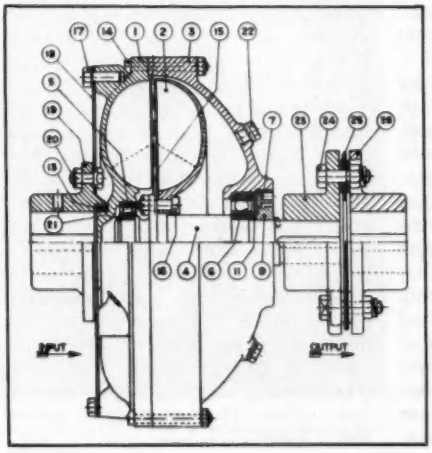
A traction type unit is illustrated sectionally in Fig. 36, from which it will be seen that the components indicated are (1) impeller, (2) runner, (3) casing, (4) shaft, (5) roller bearing, (6) ball bearing, (7) casing nut, (8) gland diaphragm, (9) gland nut, (10) casing distance piece, (11) shaft distance piece, (12) cupped washer, (13) spherical spigot ring, (14) casing bolts, (15) baffle, (16) runner bolts, (17) driving bolts, (18) resilient driving spider, (19) driving boss, (20) driving boss colts, (21) circlip, (22) filler plug, (23) runner half coupling, (24) multidisc coupling bolts, (25) multidisc plate assembly and (26) output half coupling.

The shaft of the electric motor, or driving unit, mounts the driving boss (19) with the spherical spigot of the impeller (1) registered therein. The torque is transmitted to the driving bolts (17) by means of the resilient diaphragm disc (18), and the casing (3) is, in turn, bolted to the impeller. The runner (2) is secured to the shaft (4) which runs on two roller bearings (5) and ball bearing (6), the latter taking care of the hydraulic thrust. The gland assembly comprises a mild steel nut (9) with an inserted lead bronze ring on which runs a lapped steel diaphragm secured by the casing nut (7). Torque from the output shaft is transmitted as shown through a multi-disc flexible unit (25). Thus, with its flexible input and output mounting, it will be seen that the fluid coupling permits a small degree of angular flexibility and, in effect, acts as a short carden drive. Two important features of the traction coupling are the baffle (13) and the comparatively large reservoir chamber between the casing and the back of the runner. The impeller, runner and casing are made from aluminium castings with the vanes set radially, so that the fluid coupling transmit. power equally well in either directions

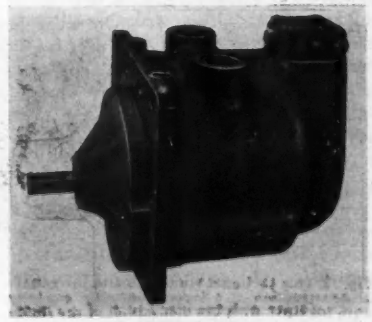
The power transmitting medium is a light mineral oil, which is filled to the required level through the plug (22). Thus when rotated the impeller acts as a centrifugal pump and the runner as a turbine, the torque building up as the square of the input speed. At the point where this torque exceeds that of the resistance torque, the runner will commence to revolve and, at normal full load and speed, will rotate at about 98 to 96% speed of the impeller. This corresponds to a slip of 2 to 4%, the ratio of output torque to input torque being 1:1 under all conditions of slip.

Correct Installation Imperative

As observed in a previous article, hydraulic couplings of this type provide inherently low-maintenance drives subject to virtually no attention after they have been correctly installed and fitted. The latter is, however, most important. The first stage of installation is the assembly of the motor and fluid drive. This comprises the removal of the hub from the coupling impeller and the fitting of it to the keyed motor shaft. The fluid drive assembly is then dropped in position and the mounting hub firmly bolted to the impeller. As the alignment problem in installing a fluid drive is to hold the manifold clearance at the outer and inner castings, both radially



(left) Fig. 36. Sectional arrangement of traction type fluid coupling. Fluidrive applied to ring-frames, for example, gives smooth starting, simple control and stepless speed variation



(right) Fig. 37. The low movement of inertia of the teelsvite unit permits use of available input power and high deceleration without the occurence of undue shock loads

and axially, care must be exercised in tightening up the hub bolts to ensure that the faces of the hub and impeller meet squarely so that the impeller does not run out of true.

If a rigid sub-base is employed, the motor is first bolted to the base and the coupling aligned to this by means of shims. After bolting down, the alignment bolts between the outer casing and manifold (fitted to ensure that the manifold clearance between the outer and inner casings are held correctly during shipment or dismantling) should be removed and the unit checked for free running without binding. The entire unit on its sub-base is then aligned with the driven machine, by shimming under the sub-base.

Where no individual base is provided for the motor and hydraulic coupling, and the driven machine is on the same rigid structure as the motor, the hydraulic coupling is mounted on the motor; then the motor and overhanging fluid drive are aligned, as a unit, to the driven machine. The runner shaft is held rigid by the alignment bolts, so that it can be aligned to the driven machine shaft by shimming under the motor feet. After the motor is bolted in place, the manifold can be shimmed and bolted to its support. The bolts holding the casings can then be removed, allowing the motor to rotate. These bolts should come out freely if the unit is correctly shimmed and the casings are not strained.

Hydraulic couplings operate best on a good grade of straight mineral oil having a viscosity of about 150 SSU at 100°F., an oil which is available wherever turbine oils are sold. Filling with the correct amount of oil is carried out with the coupling running but, in the case of scoop control units, with the scoop in the withdrawn position. Unscrewing the filling-turndish top opens a valve through which the light mineral oil is poured until an oil witness is observed, signifying that the rotating annulus of oil has reached the scoop top. This level should be maintained. Additionally, it is desirable to drain, and replenish, the oil once a year in ordinary atmospheres and more frequently in atmospheres contaminated by chemicals.

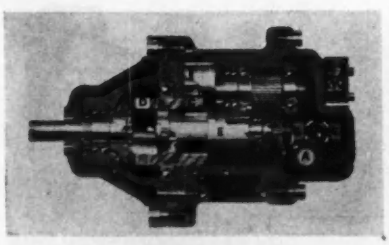


Fig. 38. This sectional view indicates the general construction of a typical variable capacity unit, together with the disposition of the internal components

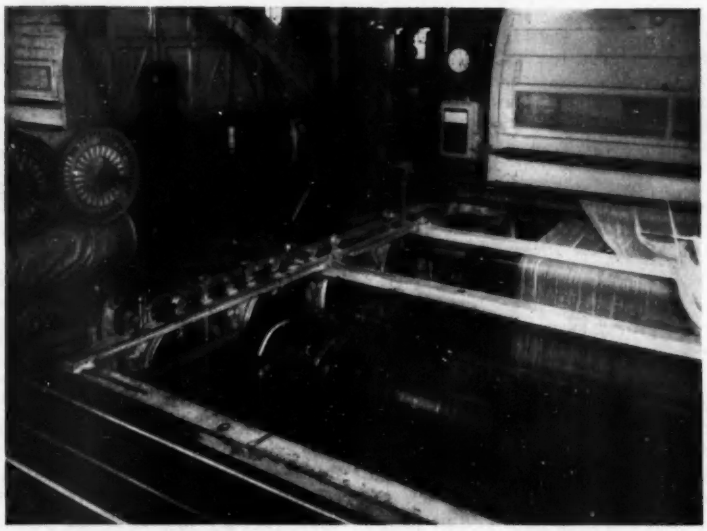


Fig. 39. The output shaft speed range of the size 4A Carter hydraulic infinitely variable speed gear, driving this sizing machine is between 1,400 r.p.m. and about 50 r.p.m.

Loss of oil should be prevented. There are a number of contributory factors here, amongst which oil spilling due to overfilling can be quite common. Another cause is leakage from the unit itself. To prevent this, all bolts should be tightened after a unit has been run and is warm from use. Periodic tightening is desirable. For oil piping joints, the use of an oil resistant non-hardening compound prevents leaks. The packing nut for the scoop-tube shaft should not be tightened unless a leak appears. Then it should be tightened only enough to stop the leakage. It is easily replaced by removing the nut and pulling out the old packing with a hooked tool.

The foregoing servicing notes apply only to the coupling. Attention must, of course, be given to ancillary equipment. Thus, all holding-down bolts must be periodically checked for tightness, whilst all outboard bearings, where fitted, require lubrication and scheduled inspection for wear. The gear used for control of the scoop position must also be frequently examined. This gear includes level control, handwheel control and remote electric hand control (using damper-type torque motors) together with air-operated pistons and diaphragm motors, and hydraulic devices. It is particularly important that each of these controls be maintained in good working order and that all wear in linkages be kept to the minimum.

Rotary Drives

Concentrated development in the use of hydraulics has resulted in the availability of rotary and straight-line drives for most purposes. Considerable operating problems, not unrelated to difficulties of maintenance, can, however, be experienced through inattention to basic data during the initial planning stages. With rotary drives it should be decided whether the actual speed range available is essential and if a proportionate range and the use of a reduction gear is acceptable. If a reduction gear is used it must also be ascertained if the power output figure is inclusive or exclusive of reducer efficiency. In all cases, the starting and maximum torque, or power required, at various points in the speed range must be known, as should also frequency of operation.

Many makes of hydrostatic equipments are on the market for incorporation in rotary drives; of which examples are shown in Figs. 27 to 40. In Figs. 37 and 38 are illustrated typical Keelavite rotary abutment units. These form a range of hydraulic pumps and motors having either fixed or variable capacity; each possessing the desirable characteristic of low inertia—a property enabling the best use to be made of an available input power and permitting high deceleration without the occurence of undue shock loads.

The output of the variable capacity unit is controlled by axial movement of the rotor assembly, which regulates the effective axial length of the annular pumping chamber and hence the actual volume swept on each revolution of the rotor blades. The rotor blades (C) engage with axial slots in the rotating housing (D), by means of which the rotor is driven. At the end of the driving shaft remote from the rotor are the timing gears which drive the rotary abutment. A non-rotating centre (E), through which runs the rotor shaft, provides a movable end wall to the annular pumping space, and, by moving axially with the rotor assembly, forms a continuous seal with the ends of the rotor blades. The other end of the annular space is, of course, provided by the cylindrical end wall of the rotating housing (D).

Axial movement is imparted to both the rotor and the rotor centre (E) by angular movement of the transverse shaft (A), through the medium of a short lever carrying a self-aligning bearing (F). The latter is thus caused to move freely between the forks (G), which consequently transmit the required axial movement to the rotor assembly.

Applications of Carter hydraulic infinitely variable speed gears are shown in Figs. 39 and 40; the A and F types respectively. All units embodied in these ranges should be installed, operated and maintained strictly in accordance with the maker's instructions. Servicing of the gears comprises examination of the oil level at weekly intervals. The oil should be completely renewed after one week of commissioning, and thence after each three to six months' operation; taking care to ensure that no dirt or grit enters the unit. If, for the required duties, the correct size of gear is selected and installed and careful attention is given to the installation and operating instructions, then satisfactory service of a long period may be expected. The only parts normally recommended to be stocked and fitted by users are the oil seal components.

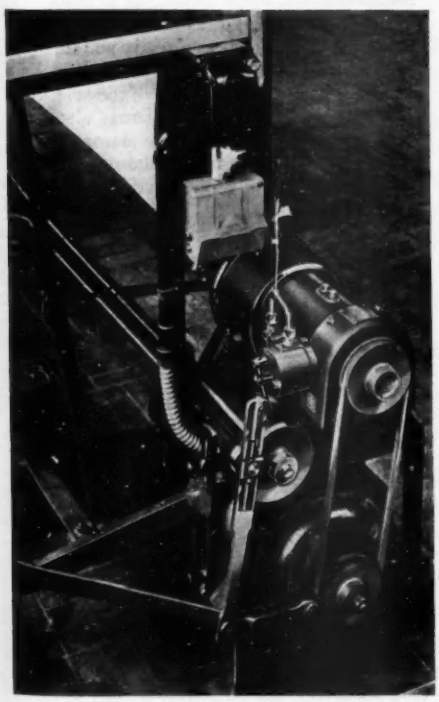


Fig. 40. An F10. Carter gear incorporated in the drive to a cloth inspection machine

Dirt an Enemy

Importance must be attached to the proper operation of the pumping unit, the focal point of a hydraulic system. The chief enemy to pumps, motors, cylinders and associated control gear is dirt—in any form. More failures can be attributed to dirt than any other cause; avoidable in most cases if proper filters had been fitted, or if the correct filters had been kept clean. Fig. 41 illustrates a unit embodying means for combating this danger. The fitting of a proper intake filter, i.e. one that will remove all harmful solids from the oil stream, does not, however, prevent water from being circulated through the system, if introduced with the oil, through condensation or some other source. The possibilities of this should be guarded against at all times, otherwise there is grave danger of rusting and pitting of internal surfaces. A rule to follow, as far as dirt is concerned, is never to operate a system without the intake filter in position.

It is also to be noted that foreign particules can very easily be introduced into a hydraulic system during installation and repairs. When installing, or reassembling the various pipes, tubes and fittings, it is essential for them to be absolutely clean free from scale and all kinds of foreign matter. This also applies when fitting replacement parts or pipes. The inside edges of tubing and pipes should be reamed after cutting to remove burrs.

Tubing should not be welded, brazed or silver soldered after assembly as proper cleaning is very difficult in such cases. Good practice dictates that tubing must be accurately bent and fitted so as to obviate the need to spring it into place. If flange connections are used, these should fit

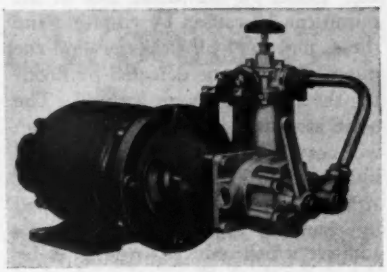


Fig. 41. Sludge, dirt, and grit are common causes of failure in hydraulic equipment. To comply with the requirements for a clean oil supply, the Savey pump and motor unit is fitted with a self-cleaning filter

squarely on the mounting face and secured by bolts, screws or studs of the correct length—drawn up evenly to avoid distortion in the valve or pump body. It is also advisable to inspect all threaded fittings to prevent metal slivers, produced during threading, from entering the hydraulic system.

Entrained Air

Operations at pressures beyond the capacity of a pump, and at speeds beyond the range for which it was designed, will lead to failure. This condition is also inevitable when a pump is operated at excessively low or high temperature. The former state increases the viscosity of the oil and, in consequence, can result in oil starvation. High temperature, on the other hand, reduces the viscosity of the oil. It also causes the pump seals to become brittle or shrink, the lubricant to leak out of the pump bearings and the operative oil to deposit residues on the internal surfaces of the pump.

Another possible cause of accelerated breakdown is cavitation. This may be due to a number of faults, such as dirty fluid clogging the intake filter, improper fluid temperature, air bubbles entrained in the working fluid, an intake pipe of insufficient capacity, etc. If not a fault in design, cavitation can easily be checked and remedied. It is accompanied by noise, and thus each possible cause may be eliminated in turn until this noise disappears. Restricted flow on the intake side of the pump would be the first on the list, commencing by cleaning the filter. Here it must also be observed that a dirty air vent or breather on the reservoir may be responsible for the fault.

Air leakage into the pump is detrimental to both operational efficiency and working life. Common causes are leaky seals, low fluid level, foamy fluid, a leak in the pump intake,

etc. Leaks on the intake side of the pump can be caused by vibration and these, together with leaks around the pump seal, may be detected by flooding the suspected parts with oil. The noise attendant upon air in the pump will cease when the air leak is sealed by the oil so applied. The ingress of air due to foamy liquid can be stopped by changing the fluid, by using an additive which reduces foaming, or by improving the baffles in the reservoir.

Generally, it can be said that air bubbles entrained in a hydraulic fluid cause poor feed, cavitation, suction failure and noise; by affecting the bulk modulus of the fluid, pressure build-up time is increased and hydraulic stiffness is reduced. This is particularly objectionable in servo systems as it tends to produce instability. However, as air rises to the highest point of a hydraulic system, it can be removed by bleeding-off through suitable valves at these points. Thus, if not already provided, it is advisable to fit a system with bleed valves at all points where air may collect. They are available for welding direct to pipes, cylinders, etc., or with connector ends screwed with a parallel external thread, for use with joint washers.

Straight Line Drives

The proper installation of straight line drives is governed by such factors as the maximum thrust required from rest, weight of load and nature of carriage or slide, speed range of piston for forward or return strokes, or complete cycle time, and length of dwell between cycles of the piston. Examples of a few types of hydraulic cylinders are shown in Fig. 42. Produced by Keelavite Rotary Pumps Ltd., these are available in a wide choice of mounting arrangements, including front and rear flange, clevis, foot and trunnion.

A common fault likely to arise in the operation of hydraulic cylinders is oil leakage, and here it should be understood that although the function of a hydraulic seal is to prevent leakages between surfaces having relative movement, reciprocating and rotary seals differ fundamentally in their mode of operation. In the former case, the swept area of the seal is usually large. Thus, any heat generated by friction is dissipated over a large area; speeds of travel, moreover, are rarely high and the operation frequently intermittent. In contrast, rotary seals run continuously on the same area and, at the high speeds common in rotary machinery, considerable heat is developed. This heat cannot be easily transmitted from the rotating surfaces.

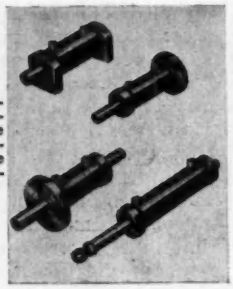


Fig. 42. These cylinders, in which castings and tie-rods are eliminated, are available in a wide range of mounting arrangements

The choice of seals for rotary movement is usually between soft packings, leather seals, rubber and synthetic seals, journal seals and face seals. Reciprocating seals may be divided into gland seals for piston rods and press rams, piston seals and packingless seals depending upon a lapped fit between the piston and the bore. Both forms are required for a variety of ancillary equipment.

Abrasion is one of the most common causes of failure in reciprocating seals and packings due to foreign particles in the oil or bad surface finish of mating parts. The former can only be rectified by changing the fluid in the system—at the same time, however, efforts should be made to trace the source of contamination. The latter fault calls for the checking of piston rods, and cylinder bores for scoring, coarse ground finish, etc.

If not too bad, the parts can be ground or polished. The best finish is afforded by hard chrome plating. Excessive oil temperature in the system can be responsible for rapid deterioration of seals and packing, whilst failure is also very often caused by the use of packing material incompatible with the hydraulic fluid. This may occur during repairs and is only cured by having resort to proper materials.

Employment of too-soft packing materials is usually responsible for the blow-out of flange or cup packings, also for the heel extrusion or forcing of packing between the piston and cylinder. The former failure can also be due to inadequate compression. Alternatively, a packing that is too tight can be responsible for excessive heat.

Synthetic-rubber "O" rings, classed as automatic packings, are now widely used because of their ease of assembly. There is, however, nothing new in this application. A similar design has been used for many years in connection with the vacuum cylinders incorporated in braking systems fitted to railway rolling stock. A disadvantage of the "O" ring, also those of the square section used in modern hydraulic equipment for sealing purposes, is their tendency to wear flat, and to twist, with increase of pressure. The use of leather backing rings to nip the ring tightly is of assistance, but generally, where very high operating pressures are encountered, the rectangular ring is to be preferred. Spiral twist in "O" rings may, however, be due to piston rod eccentricity in the cylinder, which causes side loading.

Other types of failure are (1) swelling, (2) cracking, (3) compression set, (4) local erosion, (5) extrusion and (6) even lacerations around the periphery of the ring. Failures of type (1) are obviously due to incompatibility with hydraulic fluid or contaminants, whilst type (2) can be caused by excessive heat or cold causing respectively, permanent and temporary hardness. Replacement is called for in both cases, but full rectification necessitates tracing the trouble responsible for the high temperature and fitting an oil heater to offset the effect of low-temperature environmental conditions. Compression set (3) or permanent flattening of the ring, can be caused by excessive pressure. It can also be an effect of high temperature. Both should be checked.

Local erosion (4) a result of abrasive wear may be caused, as already stated, by damage to metal surfaces or bad finish of mating surfaces. Excessive gap at the back-up ring split may also be responsible for the same damage. In this case the rings should be replaced; ensuring proper overlap and a 30° scarf at the ends. Sharp groove edges can cause ring estrusion (5). These should be smoothed and polished. It may also be brought about by excessive operating pressure, a feature calling for the incorporation of back-up rings. They prevent the adverse effect of high pressure, but must have no sharp edges, otherwise there is a danger of damage (6) to the ring itself.

Control Valves

It may now be seen that careful maintenance of pumps, motors, cylinders, reservoirs, interconnecting piping and ancillary equipment is essential for high-precision hydraulics. Equal care must be accorded to the various control valve embodied in a system. Should faults occur, the maintenance fitter requires to be conversant with "trouble-shooting"

(continued on page 270)

Controlling Variation in Woollen Rovings

Some of the many important factors which demand full consideration in order to maintain machine and operative efficiency and yarn regularity

By W. J. CROFTS

EVENNESS of yarn weights is one of the main aims in woollen carding, and any great variation in yarn counts can be a loss to the mill in the form of seconds. The causes of uneven roving weights in the woollen card room can be divided into two categories: those leading to a variation in average 50-yd. roving weightings and those responsible for a marked variation in the size of individual roving ends. Both must be controlled to make an acceptable woollen yarn.

It is essential that the blends be well prepared and evenly moistened. The next step is to check the automatic feeder to be sure that all working parts are adjusted to handle the blend properly. Uneven roving weights can start with wrong methods of filling the hopper. If the stock is thrown into the hopper in large lumps, the mass presents an uneven surface to the spike apron and causes spotty distribution on the spikes. Expert adjustment of all working parts of the feeder tends to offset sloppy filling of the hopper.

Comb Setting

The comb should be set as close to the spikes as practical, with about ¼ in. clearance, and it must be set evenly all the way across. A piece of flat iron or hardwood ¼ in. thick makes a good gauge. Next, the weight on the scale pan should be set so that the pan is level full when it tips down to stop the spike apron. These two adjustments cause the spike apron to make a long run and give the weighing pan its full quota of stock, and in doing so that apron takes stock from a larger surface of the mass.

The stock as it rolls around in the hopper loses some of its moisture from exposure to the atmosphere; it can lose as much as 5% by actual test, even with controlled humidity. Since an uneven moisture content is built up as fresh stock is fed into the hopper, a long run of the spike apron helps level off this condition. A short run of the apron, for example, might take only freshly-fed stock containing 30% moisture; on the next cycle the apron might take stock containing 25% moisture or less. This action alone would cause 5% variation in roving weight at the finisher.

There is another good reason why filling the scale pan level full is wise practice. As the spike apron stops, the strip apron throws a certain amount of surplus stock into the weighing pan over and above its prescribed quota. The amount of this surplus may vary somewhat over a series of weighing and cause a variation in roving weights. If roving weights are too heavy when the scale pan is level full, the speed of the feed rolls must be reduced; if weight is still too great, the speed of the metallic breast should be reduced since the breast directly controls the speed of the feed rolls. A full scale pan goes a long way toward establishing an even output of stock from the first breaker and stabilising roving weighings.

Prevent Apron Sagging

When one is setting the feeder comb close to the spikes, the card setter should make certain the spike apron is held steady in its position with no chance of sagging away from the comb because of pressure from the stock. The feeder has wooden mouldings running up and down the length of the apron at each end of the slats that are rigidly fastened to the inside of the hopper frame. These wooden strips in conjunction with the smooth wooden rollers inside the apron hold the apron steady if the rollers are adjusted to hold the working side of the apron close against the long wooden mouldings. This action prevents the apron sagging and kicking back to lock the spikes in the teeth of the comb.

When installing a new spike apron, the wooden mouldings and rollers should be inspected for wear and deterioration and replaced if necessary. Sprocket-driven spike aprons have idler shafts and sprockets through the inside of the apron that hold the apron steady against the wooden mouldings. Older feeders have thick strips of wood fastened to the comb arms to which the comb blades are attached with wood screws.

It is wise to check for loose or missing screws and at the same time ensure that the comb blade is straight and level. All these precautions give an even delivery of stock to the feed table all across the card and make for a uniform web at the broad-band feed. As the level of stock goes down in the hopper, less pressure is exerted against the spikes and less stock adheres to the spikes. The period needed to fill the weighing pan is therefore longer—sometimes too long—and the pan does not get its full weighing of stock.

Machine builders have provided devices to compensate for this lowered pressure of stock against the spikes. But often this helpful apparatus is completely disregarded and on older-model feeders it may be improperly installed. For best performance, the supporting rod should be installed approximately 2½ ins. from the spike apron, which allows the arms and pressure wings to exert full pressure and hold the stock firmly against the spikes. When the supporting rod is inserted through holes 6 or 7 ins. from the spike apron, the angle is such that pressure wings cannot attain full pressure at the critical position.

The Balancing Edge

Perhaps the most vital point on the entire feeder is the pivoting or balancing point of the scale pan. This point should be very sensitive so that the pan tips quickly and instantly after receiving its weighing of stock. The wedge-shape pins upon which the inverted V-blocks rest must be kept sharp and smooth. Contrary to popular opinion, the inside point of the inverted V should not come to a sharp point but should be rounded like an inverted U. This shape allows more freedom of pivoting and offers an obstruction to the sharp edges of the supporting wedge-shape pins. These pins sometimes wear grooves in the inverted V-blocks and cause the scale pan to hesitate momentarily instead of tripping with a decisive snap; this action may produce uneven weighings.

To correct this condition the grooves should be filed or ground away and the point of the inverted V made wide and rounded. Ball-bearings for the pivoting points of the scale pan are excellent, and they give trouble-free service if kept clean and well oiled. The next step is to get a solidly packed feed table free of thick and thin places. If this condition is not attained, then the gain from the previous operation is defeated.

All working motions of a feeder are changeable either by simple adjustments or by changing the speeds. The number of dollops per minute of the weighing pan can be changed independently of the feed rollers to suit the kind of stock being handled. Short compact stock requires more dollops to form a compact table feed than the lofty coarse-fibre blends. Stock such as short, fine wool or fine worsted tops require at least three dollops for every 15 ins. of forward movement of the table apron to build a firm, compact feed. For lofty stocks, two dollops for the same forward movement is about right; but if the stock piles up on the table too much the speed must be reduced. Nearly all modern feeders are equipped with chain drives and the speed is changed by using different-size sprockets. Very old feeders have a gear-drive dumping assembly, and speeds are changed by bevel gears.

Make Adjustments Carefully

To determine if the adjustments are correct, make a chalk mark on the empty table apron and a corresponding mark on the frame. Then turn the feed rollers by hand and count the number of dollops per 15 ins. of forward movement. The pusher board directly under the scale pan is designed to push each dollop of stock forward and press the stock firmly against the preceding dollop. Its forward progress is much faster than that of the apron so that it can press each weighing of stock firmly against its predecessor and thereby build a compact feed on the table. Adjustments are provided and should be made so that the pusher board travels the complete distance in its slot on each trip forward and back. The feed should be the same thickness all the way across to permit more even web at the broad-band feed. The setting of the feeder comb largely controls even distribution of the stock across the card.

A sure but severe test to determine if the first-breaker table feed is free of thick and thin places is to doff a spool of roving and take 12 or 14 weighings in quick succession. If the standard weight is 90 grains per 50 yds. of rovings and the weighings are 86, 87, 88, 89, 90, 91, 92, 92, 91, 90, 89, 88, 87, and 86 grains and this cycle of weighings is repeated all though the spool, this condition is a sure indication that the first-breaker table feed is not being packed solid. The feed is probably like the furrows in a ploughed field.

The heaviest weighings, 91 and 92 grains, come smack in the middle of each dump of stock and gradually taper off on both sides of the dump. Such a situation calls for increasing the speed of the dumping assembly. Just looking at a table feed can be misleading because the feed may appear to be firmly packed; but checking with the finger tips may reveal a variation in density of the stock. Only a slight variation here is enough to produce very uneven roving weights.

The broad-band table feed must be smooth, compact, and free of thin places. Make the band of sliver as broad and thin as possible without risking breakage. There should be a wide overlapping similar to shingles on a roof as the bands of the web are laid out. Three thicknesses of web are necessary; four are even better. But it is possible to overcrowd the feed and cause the webs to buckle and double at the feed rollers.

Thick and thin places in the finisher table feed will give weighings similar to those from a thick and thin first-breaker table feed, but the cycle is much shorter and there is a quicker change in weights. Incidentally, the web from a two-cylinder first breaker is much smoother than from other types of breakers and it makes a smoother feed on the finisher table feed, which in turn produces more even roving weights.

Textile Mill Maintenance

(*continued from page 268*)

procedure in order to take remedial action without undue waste of production time. Incorrect operation is easily observed, but this should be accompanied by the ability to diagnose the case rapidly and rectify it.

Stiffness in manually-operated valves and sluggish movement of pilot and solenoid-operated valves, may, for example, be due to either (1) contaminants deposited in the valves, or (2) excessive restriction of flow causing local overheating and formation of deposits in the valves. It will be seen that in both cases deposits are formed in the valves, a feature that tends to cause the valve elements to stick. In the case of the solenoid-operated valve overheating of the solenoid is bound to occur when the deposits are present. Cause (1) calls for inspection of the fluid and oil filters and, if necessary, replacement of one or both.

From cause (1) it will also be seen that the incidence of dirt in a system is detrimental to all operative components. Sticking of the valve elements is, however, not the only cause responsible for the overheating of solenoids. This may be due to incorrect supply voltage, in which case it will be necessary, after checking the voltage, either to correct the supply or to replace the solenoids with others suitable rated.

Contaminants are usually the cause of sluggish movement of pilot-operated valves and this source of trouble should first be checked. Should deposits not be present in the valve, the fault is probably due to slow or incomplete motion of the actuating valve. Here the working of the actuating valve line pressures should first be checked and, if found correct, the actuating valve should be inspected for contaminant, wear, etc.

Many types of valves incorporate springs in their design, and, whilst these operative elements can be relied upon to give long and efficient service, they tend, as in other mechanisms, to deteriorate with the passage of time. The slow return of spring-operated valves, for example, is invariably due to a spring fault. Thus, if this operating fault occurs, the springs should be examined without delay. If failure is not the fault, the springs should further be inspected for rate and thrust. Broken or fatigued springs should be renewed, but, if the fault is not due to either of these causes, it is advisable to fit stronger springs. Hunting or chatter in spring-loaded valves is also usually due to a wrong spring rate. As such, the remedy will probably comprise the changing of springs to a different rate with damping characteristics.

Internal leakage of valves will, of course, result in improper operation of a system, and is due to a number of causes. It may be due to excessive wear, scoring, etc., by abrasives in the working fluid. Examination and measurement of the valve elements is needed to ascertain whether the valve is faulty, and replacements made as needed. At the same time the condition of the fluid and filter should be checked for cleanliness and deterioration. In the case of spring-loaded valves, internal leakage may be due to faulty springs. These should, therefore, be examined for weakness or fracture and, if necessary replaced.

With poppet or ball valves, lodgment of grit or foreign particles between the valve element and seating provides conditions for internal leakage. Cleaning the valve thoroughly will remove the trouble at the valve, but not the source from which it arises. The condition of the fluid and filters should also be checked; remedial action is usually required. Leakage with this type of valve can again be due to damage to the valve element or its seating. Thus, if dirt is not the cause of improper operation, both element and seating should be examined and the damaged part renovated or replaced. When this form of injury is experienced, it is advisable to check for excessive operating pressure and particularly for surge pressures. These are detrimental to the valve and should be rectified at once.

The 370-Minute Jacket

Wool clipped from six sheet at 8 a.m. on June 18 was transformed into a kilt jacket in 6 hours 10 minutes and the jacket was worn at a dinner that evening celebrating the 125th anniversary of A. and J. Macnaughton Ltd., woollen manufacturers, of Pitlochry. This fast wool-to-wearer effort beat the record of 1811 when a full-tailed purple hunting coat now widely known as "the Throckmorton coat," because it developed from a 1,000 guinea wager by Sir John Throckmorton, was made from raw wool clipped on the same day in 13 hours 20 minutes at Newbury, Berkshire. But the two events differed in that everything was done by hand in 1811 whereas the 18 or more processes involved before tailoring last Saturday's jacket involved the use of modern mill machinery. So far as records are concerned, a Yorkshire firm (John Crowther and Sons (Milnsbridge) Ltd., in association with a firm of multiple tailors, managed to produce a three-piece suit (from the shearing upwards) in 2 hours 9 minutes.

Designing the Faster Carpet Loom

By F. R. TIPLER

ANY manufacturing business must constantly keep up to date with the mechanics of its production plant if it is to keep abreast of competitors. More production and shorter working hours means that machinery must be in first class condition if it is to cope with the faster running speeds demanded. It must also be designed in such a way that it can handle the greater stresses imposed on it, and at the same time, be able to maintain complete stability.

Carpet looms by reason of their many reciprocating motions are not entirely free from some form of vibration, but it is possible by careful design to reduce this to a minimum. Greater precision and closer working tolerances are now of first importance. These are some promising schemes for running looms at faster speeds in the course of development, but it is not intended in this discussion to go into these in any detail, but rather the means to attain them.

Ball and roller bearings of the correct type are necessary for shaftings, and these can be of the plummer block type or flange mounting variety as the designer may prefer. There are many places in a carpet loom where bearings of this type can be used successfully. Accessability for any dismantling job should be taken into account when positioning bearings, since a lot of time can be lost if the best part of a loom has to be taken down to replace one broken ball or roller race.

An often overlooked condition that causes noisy and inefficient running is the slack or play developing in worn or badly fitted actuating rod connections. This can get so bad that the transmitting cam, or lever motion, will move quite a distance before the desired action takes place; this, in turn, making it difficult to get accurate settings and timings. A certain amount of slack can no doubt be tolerated in a slow moving machine, in fact there are many very old looms still producing good quality carpet under these conditions. Any attempt to speed up a loom like this is just asking for a lot of trouble from this source alone; what should be normal lifting stresses, become a series of shock loads, with consequential damage. It is very important for the success of fast moving machinery that all connecting rod linkage should be absolutely free of any slackness at all times. It is now possible to obtain connections in the form of spherical rod end bearings, that can be used successfully on quite a number of linkages in any loom. They have a large working area for their size and consustruction is usually robust; another useful point about them is that they will work quite well even if the points to be connected are not truly in line.

Cam Tracks and Gearing

For many years it was considered that cam tracks in the rough-cast state were best suited for loom work due to the natural hard skin that cast iron developes. Whilst this is true to a certain extent it is not possible to run an accurately fitted follower due to roughness and uneven contractions of the casting, and clearances of $\frac{1}{8}$ in. and upwards are necessary. When wear has taken place this will become very much more. All this of course will not allow the loom to be run at faster speeds. Our faster loom will therefore have all cam tracks profile milled, and will be fitted with correctly machined followers, and clearances will be in the region of a few thousandths of an inch. To counteract wear steel and cast iron can be heat treated after machining, and it is also possible to have hard metal surfaces sprayed on to working surfaces.

A good all round combination is for cams to be made in a 1% or 2% nickel chrome cast iron with the followers in case hardened mild steel. Case hardening is a job best left to those who have special plants for the purpose which can control temperatures and depth of penetration accurately. Some careful redesigning of cams will be necessary at faster speeds if steady and even working of the various motions is to be maintained; a loom that is speeded up without this consideration is likely to be very jerky and violent in its movements.

Gearing is another very important feature that is sometimes not given the attention required. Gone for ever is the rough cast gearing still to be seen on a few very old slower machines. For accuracy, every gear, even down to simple ratchets, should be machine cut. Consideration should also be given to the work the wheel has to do, so that the metal specification best suited for it can be used in its manufacture. Spur gears are very suitable for straightforward drives, but there are cases where something better is desired. Timing of reciprocating motions in faster looms must be more definite, and all slackness between the teeth of gear trains must be reduced to a minimum. Spiral bevels and double helical wheels can very often be used to advantage in these cases. These, although more expensive, give greater accuracy and quieter running. Worms and their mating wheels should all be machine cut and be correctly mounted so that the load is evenly distributed over the teeth. This type of gearing is used a lot for beam let-offs and rolls. The straight tooth worm wheel used in the past has no doubt given good service, but it is not now a desirable feature to build into a modern loom owing to its bad design.

Lubrication

Lubrication is an important factor for any form of machinery, and there are on the market today some quite good systems suitable for carpet looms. The oil can be fed under pressure through small bore pipes to all bearings including the inaccessible ones. Metering valves are fitted to each one to ensure that the correct amount of oil is delivered. Drip feeds can also be arranged over cam followers and gearing. The system is supplied from a small tank that can be pressurised by hand, or mechanically after a predetermined number of revolutions of a convenient shaft. Our modern and faster carpet loom, then, will be a precision built machine with close tolerances of running surfaces; it will be stable and easy running; parts will be interchangeable with a minimum of trouble; it will be reliable and it will take full advantages of modern methods of construction and it will have a streamlined and pleasing appearance.

The Chemistry and Application of Rug-Backing Compounds

A latex emulsion must have good stability to perform satisfactorily in backing compositions

By G. BRAWNER

BACKING compounds now in use on rugs and carpeting are based on both natural and synthetic latices. Natural rubber was the first latex used for backings, but many synthetic materials that give excellent results in backing compounds have been developed. The latices are sold in the form of an emulsion that is stabilised with soap or a similar compound. In the man-made product, stability can be controlled consistently from batch to batch and the soap content is kept as low as possible. Excess soap usually interferes with the prime functions of a latex in its end use. A latex emulsion must have good stability to perform satisfactorily in backing formulas. Latices are bought on a solids-content basis, which determines the price and gives an indication of the water content, a factor that must be considered in the drying operation that follows application.

pH Controls Stability

When synthetic latex was first produced, its properties were compared to those of natural latex as the most desirable standard available. Some of the synthetic latices today do approach the various properties of rubber from natural latex, and many fall short. The control that can be placed on synthetic-latex production makes possible good consistency of all properties from batch to batch.

Good control in manufacturing has made it possible to produce latices with a particle size below one micron, far smaller than the particles of natural latex, and has also enabled producers to place different charges around the particles themselves, either cationic (positive), anionic (negative), or non-ionic (neutral). Often these charges can be utilised in obtaining better penetration of the latex. Most of the latices are stabilised in a non-ionic or anionic system. An anionic stabiliser requires a high pH to prevent destabilisation. Once the pH is lowered, there is no like charge to maintain repulsion and the latex coalesces.

This physical change occurs when a latex coating is drying, and the pH must control stability up to the desired point of destabilisation. Stability of the anionic and non-ionic backing compounds is improved by the addition of ammonia, caustic soda, or potassium hydroxide; and the desired pH is 9 to 11. All latex emulsions are a delicate dispersion of gel-like particles sensitive to severe shock, either physical or chemical; and if the dispersion is upset for any reason, the consequences can be very costly. This fact must be taken into account when the compounder prepares a coating or backing compound. He must follow a procedure of addition of ingredients; and when the compound is complete, he must protect it until it is used.

Natural Latex

Natural latex is sold in concentrated form with total solids of 60 to 62%. It is protected against bacteria with ammonia, which at the same time maintains a high pH level of 10 to 11. Because the sensitivity of each batch of latex differs, certified test results as to stability usually accompany the shipment. Uncompounded, natural latex will give a film of plastic rubber that becomes tacky and discolours with age. It is only by vulcanisation that a usable, resistant, cured product can be obtained. Used alone in a compound, the rubber is so unsaturated that only about 0.5% of sulphur is required to cure the latex. Additional stabilisation is a must in natural-latex compounds. Natural latex is the most widely used carpet backing. It gives a firm hand and strong tuft lock. Natural rubber can be loaded with fillers or extenders to a greater extent than any other latex.

Prevulcanised Natural Latex

Natural latex is often prevulcanised (partially cured) while still in the liquid state. This operation is done in large kettles with heat and constant agitation. Prevulcanisation calls for close quality control and of course increases the cost over unvulcanised latex. However, partially curing the rubber particles in the latex phase improves the qualities of tensile strength and elongation. Prevulcanised latex requires less cure time after application to attain the properties of the conventional compound.

Chloroprene (Neoprene) Latex

The properties of neoprene latex resemble natural latex more closely than any other synthetic latex. However, the presence of chlorine in its make-up can produce HCl in improper formulation; so neoprene latex has not been generally accepted as a standard latex for compounds. But there are many specialised applications where it is used to great advantage without detrimental effects. The more recently developed types of neoprene show much promise for rug-backing formulas. Neoprene is usually supplied with total solids of 34·5 to 59%.

GRS Latex

GRS latex began as "government rubber, synthetic," during the war. It is basically butadiene-styrene, and the latex is made with different proportions of these two monomers. The basic combination of butadiene and styrene is available in a variety of proportions; but for rug backing only two types, GRS 2000 and GRS 2105, are widely used. GRS 2000 is supplied with total solids content of 39 to 42% and is the cheaper of the two latices. Because of its low solids content, uses are limited to applications where quick drying is not a factor. The latex is based on 46% styrene and 54% butadiene. Because of this relatively high content of styrene, the latex has a stronger residual odour.

GRS 2000 is a hot type of latex; the polymerisation is carried out at high temperatures. Film strength of the hot types usually exceeds film strength of the cold types of GRS because of higher styrene concentration. GRS 2105 is supplied with a total solids content of 60 to 63%, a concentration that is equivalent to that of natural-rubber latex. The styrene content is about 26%; so films are more rubbery than those of GRS 2000, and the residual odour is less. GRS 2105 has more low-temperature flex and generally approaches the properties of natural rubber more closely than GRS 2000.

GRS 2105 is very often used in combination with natural-rubber latex because of (*a*) stabilisation compatibility, (*b*) equivalent solids content, and (*c*) most favourable end properties of the GRS group. GRS 2105 costs less than natural rubber but more than GRS 2000. Both of the two popular synthetics are compounded in similar ways. Because of the high degree of saturation produced during the polymerisation, the GRS types require about 2% sulphur for a complete cure, compared to 0·5% for natural latex. GRS 2105 cures slightly faster than GRS 2000, and often a reduction sulphur in content (under 2%) may be in order. Many backing compounds are formulated with GRS latex as the base latex; and when they are properly compounded, the resulting coatings function well at minimum cost.

Nitrile Latex

Nitrile latex is gradually increasing in importance to rug and carpet manufacturers. It is a polymerised butadiene-acrylonitrile and offers the compounder a rubber coating that is very resistant to oil and grease and yet maintains good anti-skid properties. Fibre adhesion is very good and cure level is low.

Many limitations exist, however, because the latex is very sensitive to ultra-violet light and heat effects. The best anti-

(*continued on next page*)

Manchester Section S.D.C.

Biological Chemistry of Cellulose

"THE breakdown and synthesis of cellulose in nature is brought about by biological catalysts known as enzymes. These enzymes are proteins and occur both within the cells of the organism and in the surrounding medium in the case of micro-organisms such as wood rots, mildews and bacteria." With this introduction, Dr. J. A. Gascoigne (British Rayon Research Association) went on to tell Manchester Section of the Society of Dyers and Colourists more about the research into the degradation of cellulose and associated substances and into the biosynthesis of cellulose in progress at the Association. "Enzymes," he continued, "are often quite specific in the reaction which they catalyse, and the removal of starch and protein sizes with the aid of enzymes has been used commercially for many years, yet these enzymes do not attack the cellulosic fibre itself."

Closely associated with cellulose in wood were the hemicelluloses, and the preparation of an enzyme acting in the hydrolysis of these compounds was described. The use of enzymes as analytical tools in investigating the structure of carbohydrates afforded an elegant approach to such problems without the necessity of high temperatures, strong reagents and swelling agents. However, in the case of native celluloses, these materials were highly crystalline and the enzymes isolated from moulds had little action of them, although the moulds themselves decayed cellulose rapidly. The reasons for this difference in behaviour were discussed and this led to a description of the processes whereby mould and enzyme actions might be retarded. Production could be provided in four principal ways:—

(1) By modification of the cellulose molecule to make it resistant to these agencies.
(2) Imposing a continuous, inert physical barrier between the cellulose and the deteriorative agency.
(3) Treatment of cellulose with a toxic agent.
(4) Treatment of cellulose with a specific enzyme inhibitor.

Each of these processes must fulfil very stringent requirements, apart from their efficiency in rot-proofing, such as having no effect on handle, drape, colour-fastness, light-fastness, and the applied finish must not be easily affected by water, scouring agents, dry-cleaning solvents, or sunlight.

The modification of the cellulose molecule by such processes as methylation, cyanoethylation and phenylhydrazine treatment was then discussed, together with the minimum degrees of substitution in the cellulose molecule needed to confer rot resistance on cotton. The effect of the process used for this substitution was pointed out. In particular, the use of swelling agents during the reaction often led to a product of impaired rot resistance, and this was illustrated by the methylation of cotton by dimethyl sulphate and alkali compared with the comparatively mild reaction with diazomethane to give the same degree of substitution. This led Dr. Gascoigne to consider that resinification offered the possibility of affording protection by all the four principal methods outlined above.

The rotting of resinated viscose in contact with horse dung extracts was described and in particular, the phenol-formaldehyde resins were shown to be superior to the urea- and melamine-formaldehyde types as protective agents. Even more effective on viscose were the halogenated phenolic resins, although other workers had found them to offer no advantage when applied to cotton. A disadvantage of such resins was the dark colours they produced on the fibre.

The production of cellulose by the cotton and flax plants had been studied by the use of radioactive tracers and from such work it appeared that a hexose phosphate was involved. One type of bacteria produced cellulose which was free from the hemicellulose and lignin so often present in association with cellulose in other natural sources, and work at the British Rayon Research Association was being concentrated on the growth of these bacteria. It had been possible to isolate from the bacteria the enzyme system which catalyses the formation of cellulose, and some idea of the nature of the intermediates between simple sugars like glucose and cellulose was being sought. In order to ascertain the site of formation of cellulose, the outer cell wall of the bacteria had been removed, and the naked bacteria were unable to produce cellulose; it seemed likely that some precursor of cellulose must come from the cell wall. A study of the crystallization of cellulose had been carried out by growing bacteria in heavy water and determining the infra-red absorption spectrum of the cellulose at different stages of growth. It appeared that crystallization occurred very soon after synthesis, and it was hoped to obtain further knowledge of the crystallinity and crystalline nature of even younger celluloses.

Rug-Backing Compounds

(*continued from previous page*)

oxidants must be used to protect this latex against discolouration. The present market price is the most limiting factor, as it is above the average price of natural latex and GRS. Most types are supplied with a total solids content of 40 to 55% and also in different acrylonitrile-tobutadiene ratios.

Specialised Latices

This group is composed of latices that are used to modify the properties of base latices. Used alone, they do not offer the compounder desired properties. They are included in backing compounds to increase hand, strength, and stiffness and in some cases to lower cost. The styrene latices are actually polymerised styrene-butadiene, with a greater portion of styrene rather than butadiene. This combination is expressed: 20/80, B.S. or 15/85, B.S., according to the proportion.

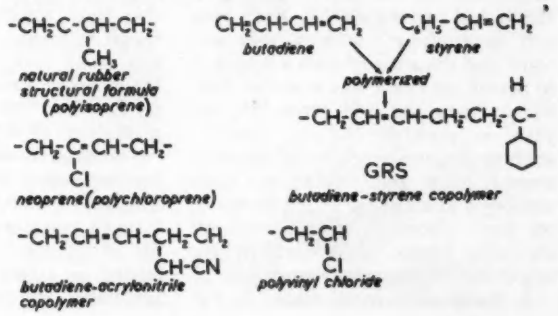
Latices that contain a high proportion of styrene are called high-styrene latices, while those in the middle range are called medium-styrene latices. The medium-styrene latices are usually film-forming when they are dried, while the high-styrene latex dries to a crumb-type powder. Styrene latices are used in backing compounds to stiffen the coating; the more styrene, the harder the film.

These high-styrene latices are compatible with natural, neoprene, and GRS-latex systems in compounds. Specified proportions of butadiene to styrene are usually a matter of personal choice.

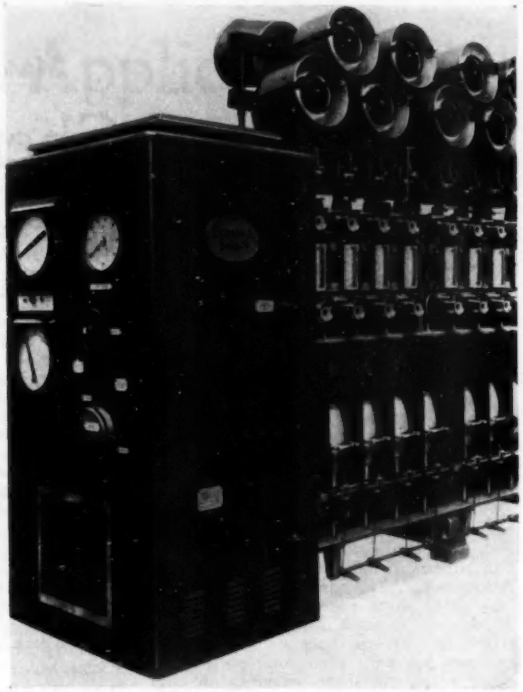
Polyvinyl - Chloride Latex

Latex based on polyvinyl chloride (PVC) is used in backing compounds for the same purpose as the styrene latices, except that it is compatible only in compounds that contain butadiene-acrylonitrile latex as the base latex. PVC latex will stiffen the nitrile rubber just as styrene stiffens GRS rubber. Actually, the acrylonitrile is a non-migrating plasticiser for PVC. The more PVC present in the compound, the harder and less plastic the properties. PVC latex is supplied at about 50% concentration. Most types available will reduce to a powdery, non-plasticised granular form.

On the right are the simplified structural formulaes of the latices discussed in this article



High Efficiency Heavy Denier Drawtwister



Developed especially for heavy denier, high tenacity synthetic yarns, the HDT.1 drawtwister incorporates a number of unique features. It will build packages of 9 lbs. weight with a delivery speed of up to 1,250 ft./min.

A NEW heavy denier drawtwister, manufactured by Dobson and Barlow Ltd., Bolton, incorporates a number of features which provide high running efficiency to meet the exacting requirements of the trade. Developed especially for the heavier synthetic yarns—particularly tyre cords—this drawtwister is designed primarily for hot stretching high tenacity yarns and is mechanically capable of producing drawn yarns of up to 2,000 den. Delivery speeds of 1,250 ft./min. may be achieved in the lower denier range, e.g. 840 den. Packages holding up to 9 lbs. net weight of yarn can be built with a lift of 14 ins.

Structurally and in layout, the HDT.1 is designed to withstand the heavy operational duty it is required to perform. The overall width is 3 ft. 5½ ins. and the length, including all electrical equipment, 41 ft. for a standard 9 ins. gauge, 80 spindle machine. Pneumatic extraction tubes are positioned below the hot plates and immediately behind the threads so that fumes produced by the evaporation of the "spin finish" are exhausted away.

An almost vertical and uninterrupted thread-line from creel package to spindle is provided and the yarn—drawn off over-end from the package—passes through a take-off guide and over a pre-tensioner unit. From the pre-tensioner, the yarn is taken to the traverse guide adjacent to the cot roll. The traverse guide is arranged so that the yarn can be wrapped twice round the cot roll before passing to the first of two draw rolls. Each draw roll is equipped with a separator roller and these are of such a length as to permit up to six wraps on the draw rolls. From the first draw roll, the yarn is normally taken round a snubber pin and over a hot plate to the second draw roll, which is again equipped to allow up to six wraps of the yarn. From the second draw roll the yarn passes down through the lappet eye to the spindle package.

A heavy duty main motor in the gearing-end is coupled by V-belts to gear trains driving the drawing sections, the latter being arranged to provide the maximum flexibility in drawing conditions. The total draw ratio can be varied between 1 : 1 and 1 : 10, the range of the first draw ratio being normally between 1 : 1 and 1 : 4·5.

The drawing section will allow either single or two-stage drawing, the first stage being arranged normally for cold drawing and the second for hot drawing over a heated plate. The hardened steel draw rolls have a substantial deposit of hard chrome on the working surfaces, and are ground and lapped to an extremely fine finish. Designed as an interchangeable unit, the draw roll shaft, bearings, gearing and housings are readily replaceable.

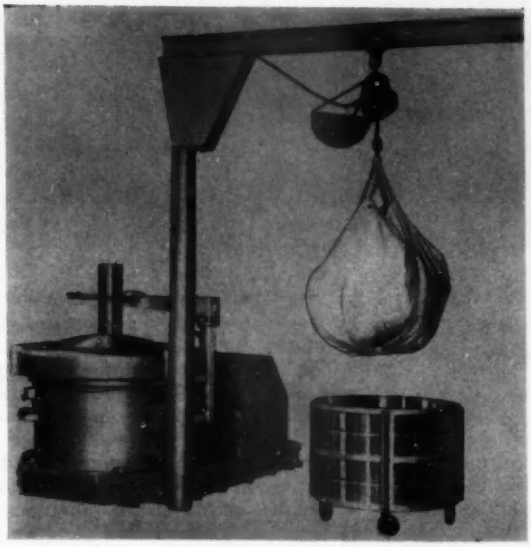
The longitudinal steel feed rollers are hard chrome plated and ground to the same limits of accuracy as the draw rolls. The cot rolls surmounting the feed rollers are covered with tough synthetic rubber cots to resist any attack from the "spin finish" on the undrawn yarn. Cot roller pressure on the feed roller is adjustable to a maximum of 18 lbs.

Operated by two patented hydraulic builder units, the lifter mechanism functions smoothly at speeds from 3 to 10 cycles/min. with a maximum lift of 14 ins. The units are controlled by a pair of small face cams, adjustable to vary the lift between 12 ins. and 14 ins. Quick and easy alteration of the bobbin build is achieved by a simple control system on the builder units. The hydraulic units are coupled directly to the lifter shafts running down each side of the machine behind the spindle rails. The angular turning motion imparted by the hydraulic builders to the oscillating shafts is converted into a uniform linear motion of the ring rails by means of racks and pinions.

The machine is equipped normally with depressible ring holders so that random or sequence doffing can be carried out as desired; fixed holders can be supplied, however, if preferred. Full-length separators are fitted between each spindle position. Provision is made also to disengage the lifter system when the machine is stopped, so that the rails can be wound down simultaneously to a waste wind position. Heavy duty roller bearing spindles with foot operated brakes are fitted, capable of carrying a 9 lbs. package at 5,000 r.p.m. They are driven by tapes, one tape to four spindles; each tape being driven from the spindle drive shaft by a separate, 9 ins. dia., balanced steel pulley.

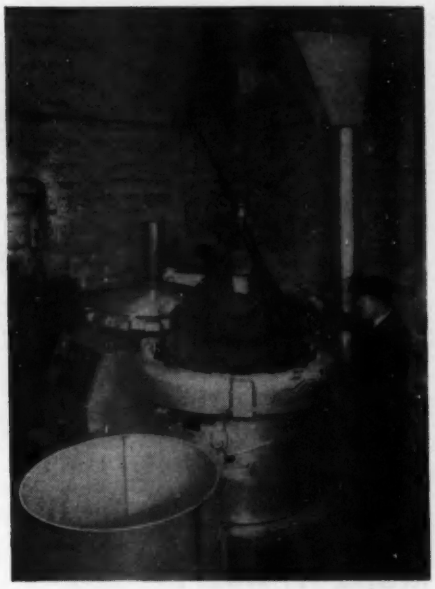
Summary of Operational Details

Denier range	Up to 2,000 den.
Max. draw speed	1,250 ft./min.
Max. net package	9 lb.
Max. lift	14 ins.
Spindle gauge	9 ins.
Max. ring diam.	7 ins.
Spindle speed	4,000—5,000 r.p.m.
Max. total draw ratio	1 : 10
Max. 1st stage draw ratio	1 : 4·5
Max. 2nd stage draw ratio	1 : 5·5



(left) A general view of the Hydraxtor unit.

(right) one of the installations in Northfield Mill, Ossett



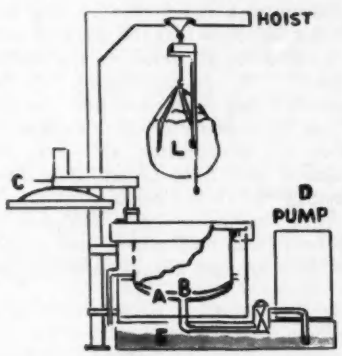
New Model Hydraxtor with Integral Water Supply

THE introduction of extraction by water pressure offers great possibilities to the textile industry particularly when foundations are impracticable. The Model KA Hydraxtor, made in Great Britain by Thomas Broadbent and Sons Ltd., Central Ironworks, Huddersfield, under licence from the Hydraxtor Co., Illinois, U.S.A., is a self-contained pressure type extractor which operates with no balancing involved as the operation does not depend on rotational machinery; this is the reason why foundations are not necessary and installation is therefore possible on upper floors. The safety factor is also particularly commendable, due to the absence of rotating parts.

Labour saving has been given special consideration in the design, and one man can easily operate three Hydraxtors using the overhead block and nylon bag system. As the diagrams show, the wet material is loaded directly from the washer into a nylon sling placed in a stainless steel truck, which is moved alongside the Hydraxtor. The sling is hoisted out of the truck and lowered into the Hydraxtor tank, the tank cover is then locked and from this point is automatically controlled.

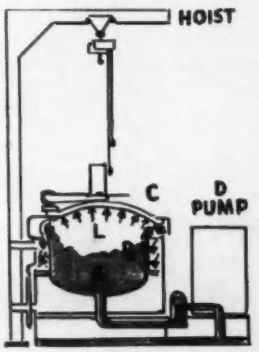
The self-contained reservoir forms the base of the machine, and the Hydraxtor is completely automatic including the time setting, pressurising the water, pressure release and the signalling of the operator when the cycle is completed. The cover of the lid is fully interlocked. It is impossible to apply pressure to the bag until the cover is secure. Similarly, the cover cannot be opened until the pressure is released. The rubber diaphragm is manufactured from moulded gum rubber $\frac{5}{16}$ in. thick and is guaranteed for 18 months, and the operating pressure of 400 lb./sq. in. is stated to give extraction approximating that of a 48 ins. diameter basket hydro extractor revolving at 960 r.p.m.

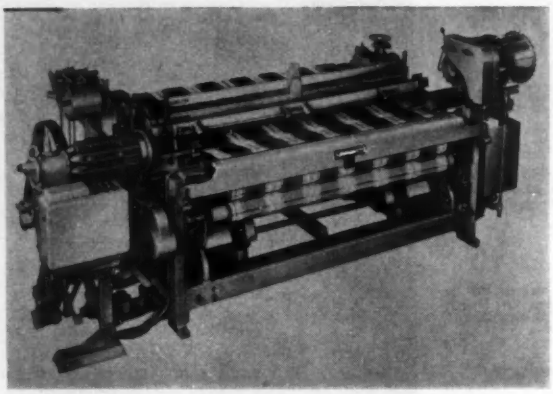
The design is quite pleasing and the construction is such that maintenance is reduced to a minimum. The supplies are easily connected to the machine and as the reservoir is self-contained it is only necessary to have drains for the surplus water after extraction. One of the illustrations shows an application at Samuel Bickles, Northfield Mill, Church Street, Ossett, Yorkshire, where the machine is operating very satisfactorily on coarse woollen rags.



(above) Lining the inside of the Hydraxtor tank is a rubber diaphragm B that is open at the top. When the load L is placed inside this rubber diaphragm, the perforated cover C is locked down quickly and securely. Then, water from the self-contained reservoir E is admitted into the tank A outside the diaphragm

(below) Water pressure is built up by the pumping unit D, forcing the diaphragm gently upward, to exert a steady squeezing action on the load. Water is squeezed through perforations in the tank cover C into drain channels. Articles do not twist or knot, and no strain is placed on the fibres, eliminating all possibility of damage





The new Schmeing loom

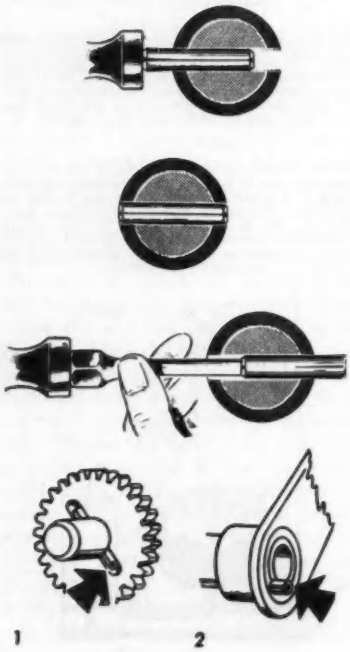
New Automatic Circular Box Loom

AN automatic circular-box loom made by Schmeing of Western Germany, has a six-compartment circular box and four of the shuttles are replenished automatically. The remaining two shuttles are available for hand replenishment, the loom coming to a standstill when the weft feeler indicates that the pirns in these two shuttles are down to the reserve bunch. A unique feature of this circular box motion—apart entirely from the automatic replenishment—is that it incorporates an underpick motion with fixed picker, thus eliminating the picker spindle.

The loom has been designed to benefit those mills where four colours of weft are not always sufficient but to give them all the advantages of automatic weaving on the four main colours in a design, with the facility for adding two further colours when required. The advantages of retaining a circular box mechanism as compared with a six-compartment drop-box are, of course, that higher running speeds are normally possible and the box control mechanism is much lighter and less complex.

The pirn change mechanism has been developed by George Fischer Ltd., Switzerland, and colour selection is infinitely variable by a "telephone switchboard" type of device. The colour selection unit is incorporated into a central control box, which also contains the start, stop and inching buttons for the loom. The drive is by Demag motor which incorporates its own brake.

The loom can be equipped with any type of dobby and in this case the movement of the circular box is controlled from the dobby. Where, however, the loom is equipped with treadle motion, control of the circular box is by means of the Luermann device which consists of a perforated steel cylinder into which pegs are inserted to transmit movement to the circular box through lever contacts. Thus the usual box chain, with all its complexities and possibilities of error, is supplanted by a device measuring only a few inches in circumference yet giving an almost infinite variety of change possibilities. Fitted with an automatic let-off motion, the loom will take warp beams up to 27½ ins. dia., and is available in reed spaces 45 to 81 ins. (Barke Machinery Ltd., Ashton-u-Lyne, are the agents for the British Isles.)



1 2

Easily driven home by hammer or automatic tool the Rollpin locks in position and is readily removed without damage to pin or hole

Spring Fastener to Replace Rivets and Screws

SUPPLIERS of springs for heavy and light industries for over 60 years, the Tempered Spring Co. Ltd., Sheffield announce the setting up of manufacturing facilities for full scale production of the Rollpin, a slotted cylindrical spring pin designed to replace screws, rivets, solid pins, taper pins, hinge pins, etc. The Rollpin is easily driven into a hole where its own tension locks it into position. Stated to be unaffected by movement or vibration yet may easily be drifted out if desired, its slot dimensions, outside diameter and elastic limits are carefully precisioned so that the locking action is achieved in holes drilled to normal production tolerances.

For ease of handling it is chamfered at both ends; it will not tangle and may easily be adapted for automatic hopper feed. Its use is said to simplify production designs and reduce assembly costs. Heat-treated during production, the Rollpin is claimed to have greater resilience and shear strength than the solid pin. Sizes at present available range from $\frac{1}{16}$ in. to $\frac{1}{4}$ in. dia.

Tempered Spring Co. Ltd., one of the largest helical spring manufacturing concerns in the world, have been able to draw upon all their craftsmanship, knowledge of metals, and research facilities for the perfection of the Rollpin fastener. An entirely new division has been created within the organisation for handling the Rollpin under the general direction of Mr. J. M. Reichwald, executive sales director.

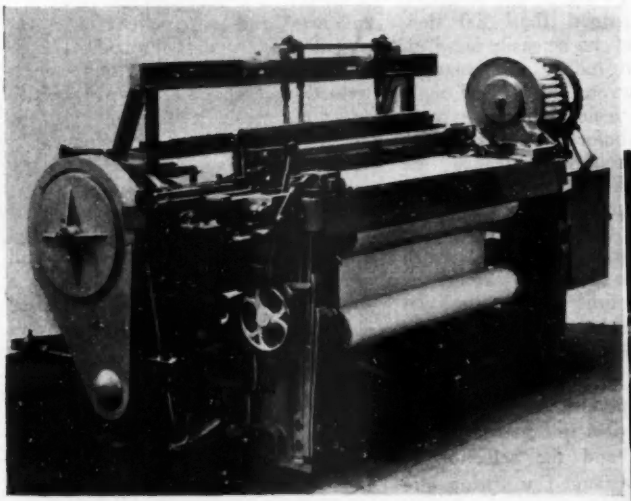
TEXTILE MACHINERY and MILL EQUIPMENT NEWS

Famous Loom Makers Introduce Two New Models

Construction and performance of the Butterworth and Dickinson A-L single-shuttle, pirn changing automatic and the G.P.R. 4×4 pick-at-will looms

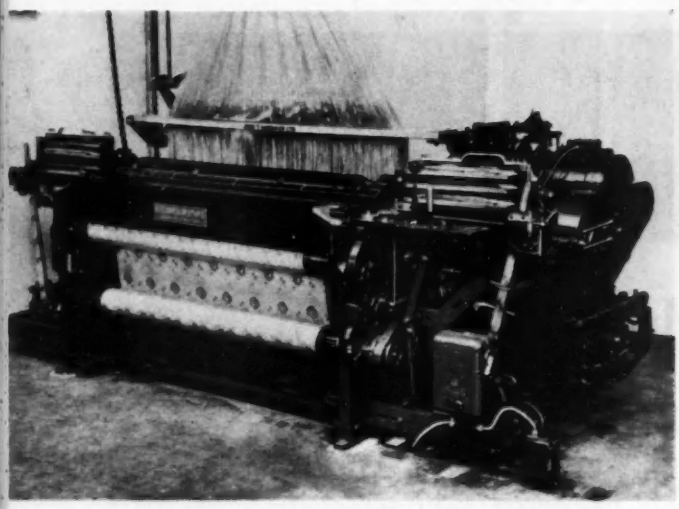
WITH over a century and a half of valuable experience in designing and making looms and preparation machinery, Butterworth and Dickinson Ltd., have firmly established throughout the world a reputation of which they are justifiably proud and, the new A-L automatic pirn changing model recently introduced as a replacement of their well-known over-pick loom, is probably the lowest priced automatic loom in Europe. Pointing out that looms in the bulk production cotton trade are usually bought in large numbers—in hundreds rather than in tens—they emphasise that the total cost is directly related to this factor. For example, if a weaving firm can purchase looms which are, say £100 per machine cheaper, the capital outlay must be reduced £25,000 on a replacement of 250 looms. This is singularly significant in the export business where lack of capital or foreign exchange is a critical factor. A similar case is the export of small British-made cars to the U.S. There is nothing revolutionary about them and they do not go at exceptionally high speeds. They do the job demanded of them, are inexpensive, easy to drive and maintain.

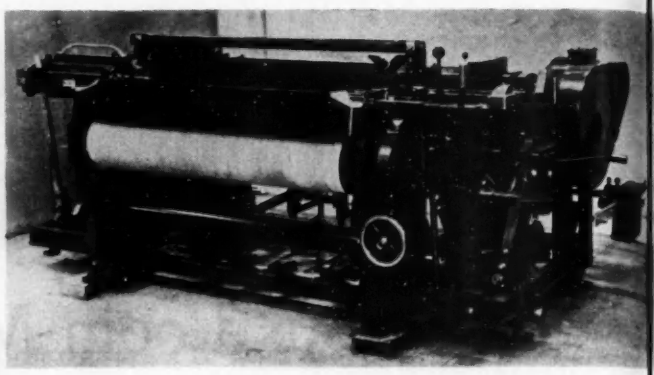
Undoubtedly good value for money, the A-L is simple in design and strongly constructed, and was one of two new looms recently shown to the press at Globe Works, Burnley. A very interesting feature of the A-L is the warp let-off motion which is a negative controlled method based on the system originally developed by Shirley Institute. Although weights, chains and ruffles are employed, the mechanism is so designed mathematically to permit the whole beam to be completely woven through without having to alter the position of the weights. A floating roller system regulates the friction applied to the beam; the friction being consistently



The "B and D" automatic loom suitable for cotton and spun rayon fabrics

Mr. J. D. Butterworth and Mr. W. P. Dickinson, directors of Butterworth and Dickinson Ltd., looking at the simple but very effective anti-lashing-in device on the new automatic pirn changing loom for cotton and spun rayon fabrics





(above) The "B and D" underbuilt two-shuttle drop-box loom for weaving quality fabrics

(left) view from the front of the "B and D" 4×4 pick-at-will loom weaving from jacquard

reduced as the warp weaves down without any increase in the actual warp tension. Judged from the standpoint of constant cloth widths and the number of picks in a given length of cloth the technical performance is certainly very good. Capable of coping with a wide range of cloths from closely-woven plains to heavy twills and drills, this let-off will also handle exceptionally heavy fabrics, the only alteration needed being the use of a threaded back-rest. The firm state that the maintenance costs are low because there are no gear wheels or ratchet pawls to wear out and no springs to replace.

The reed-space ranges from 40 in. (105 cms.) to 68 in. (172 cms.) but the actual maximum width of yarn in the reed is 4 in. less than the reed-space. Two depths of loom frame are available, the standard taking up to 12 shafts 12 mm. pitch and the deep one which will accommodate up to 24 shafts. The standard specification includes plain shedding but alternative motions such as twill or dobbies can be supplied. A continuously running motor drives the loom by "V"-belts through a cork plate clutch, the starter usually being supplied separately for mounting on a separate stand.

Cloth take-up is effected through a 7-wheel spur gear motion with an additional smoothing roller. The cloth is wound on a detachable roller by a friction clutch; the maximum diameter is 18 in. (46·5 cms.). A conventional side weft-fork is employed which can be set to operate the automatic mechanism by means of the 3-try motion. Normally, the automatic mechanism is controlled by the side sweep feeler. The 4-bar mechanical warp stop is driven directly from the bottom shaft; the mountings are suitable for additional bars if 6 are required. The automatic weft supply is from the conventional rotary magazine holding 24 pirns of either $7\frac{3}{8}$ or 8 in. A protection motion and shuttle-eye cutter are also fitted. The price for a 44 in. reed-space model is approximately £350, inclusive of motor, starter, pick-counter and 24 in. dia. alloy flanged beam. It is understood that "Unifil" can be fitted if required.

The second new B and D loom—G.P.R. 4×4 pick-at-will model—has been designed for the furnishing fabric trades where the emphasis is a versatility and quality. It is a loom with all the equipment of a silk loom, combined with a larger shuttle. Solid cops or pirns $9 \times 1\frac{3}{16}$ in. can be woven and, it is claimed that 300 den. filament viscose can be easily handled.

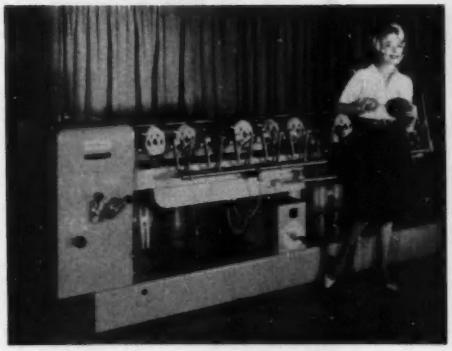
Designed to reduce the weavers' work load in several ways, the Loepfe photo-electric feeler stops the loom accurately and before the boxes change, and in the case of weft breakage the centre-weft fork stops promptly. The amount of shuttling is less and the loom is easier to handle. It can be moved backwards or forwards with friction clutches and the brake can be applied at any time to lock the loom in any position—an important point with a heavy jacquard when the machine tends to turn the loom.

The box motion works on the operated gear principle at both sides of the loom, and the selection is positive and arranged to bring the same box level with the same pegging. The motions are protected against short-shuttle flights by an escape arrangement. The basic picking motion is underpick and designed to cope with small or large shuttles over the full range of widths. Pick adjustment within normal running limits is made at one place only and pick selection is made from the swell itself; an additional pedal-operated dislocator is provided for pick-finding purposes. For normal fabrics, a positive automatic geared let-off motion is available and in this case it is necessary to use the right diameter of beam and flange and also have provision for fixing a gear-wheel in place of the usual ruffle. Delicate and medium silk or filament warps can be tensioned by the "Barritt" sensitive let-off. The take-up arrangements are interesting. For materials likely to suffer damage to filaments, a large-diameter measuring roller covered with rubber or emery surfacing is usually supplied. This is driven through a precision worm reduction gear, and arranged with two pressure guide rollers to give the maximum cloth lap on the roller. As an alternative it is possible to have a seven-wheel spur gear motion, with a normal diameter measuring roller which can be covered with steel filleting or other surfacings and arranged with either nip rollers or a single smoothing roller. The finished cloth is wound at an adjustable tension on to a separate cloth roller, which is readily removable from the loom and interchangeable. Various anti-creasing devices can be supplied.

Additional frames outside the loom-sides provide extra bearings for all shafts, in addition to the normal inside and main bearings. Driving wheels are

fitted at each side to balance torsional tendencies, and the drive is controlled through a "Ferodo"-lined cone clutch with "V" belt transmission from the motor. The motor stand, designed to accommodate standard loom motors, is exceptionally rigid and provides for easy adjustment of belt tension, without disturbing the alignment. All gears and belts are encased, and special consideration is given to accessibility, for oiling and main adjustments.

New Semi-Automatic Balling Machine

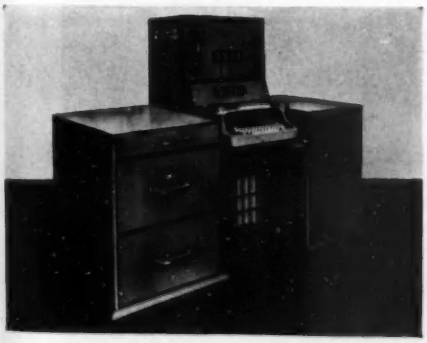


CROON AND LUCKE G.m.b.H., Maschinenfabrik, Mengen/Wurtt, Germany, announce a new semi-automatic balling machine designed to meet the ever-increasing demand for balled knitting wools.

Simplicity of design is the constructional keynote, and the latest German textile engineering principles have been embodied in the machine layout. The gearing is housed in a specially designed dustproof headstock, and the centrally positioned electrical equipment is protected in a similar manner by an easily accessible switch box. Patterning and control of ball weights are achieved by lever control governed by maintenance-free gearing, housed in an oil-bath. No gear-changing is necessary The winding mechanism, together with the expanding spindles, run on ball bearings are also enclosed in an oil-bath. Steel and Perlon gearing contribute considerably toward quiet, trouble-free running. A particularly ingenious device has been incorporated to assist doffing. Operated by a lever, this mechanism cuts all ten ends simultaneously, the protruding ends are then held securely enabling clips or labels to be attached without wasting time searching for loose ends. The remaining ends are still in the correct position to commence winding a new batch. Another salient feature is the infinitely variable precision mechanism, controlling winding irrespective of yarn thickness. When a change over is required, i.e. thick to thin yarn or vice versa, no gear change is necessary.

A counter-voltage brake comes into operation immediately the pre-determined wound length is reached. Yarn length and ball weight therefore remain constant from doff to doff. Advantages claimed, include labour economies and increased production.

The manufacturers wish to point out that they produce a non-automatic balling machine, which, although highly efficient, is considerably cheaper than the automatic and lacks the cutting device and the infinitely variable yarn thickness adjuster.



The Electronic Storekeeper

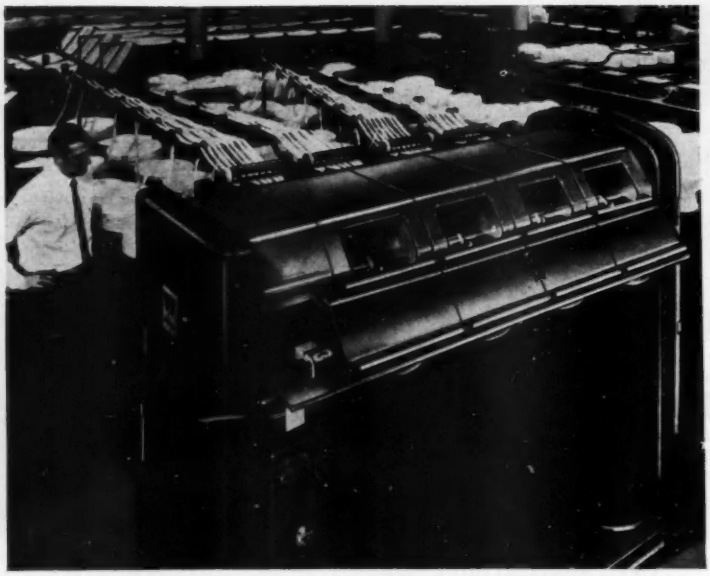
FOR some time now Electronic Machine Co. Ltd., Thornton Heath, Surrey, have been working on a specialised computor, an electronic "storekeeper," that would be within the scope and pocket of smaller organisations and here at last is the electronic "Storekeeper" that can record up to 50,000,000 items under 5,000 different headings and yet can be afforded by the most modest of organisations where "storekeeping" is fast becoming the problem.

Initiation of all records is done through the medium of a permanently incorporated electric typewriter which has been specially adapted to initiate the recording of information and is also available for the typing of all associated information on such documents as goods inwards or outwards advice notes, invoices and works issuing dockets, etc., being adaptable for the handling of all suitable type continuous stationery or single sheets.

The console illustrated here is the basic model. Larger models are available according to article and catalogue requirements and are obtainable in multiples of 10,000 and 5,000 respectively.

Operation is simple. By pressing the initiation tab and the plus or minus tab followed by the catalogue number, the recording drum is prepared for the acceptance of the quantity of articles to be added or subtracted, the manipulation of the following keys causing their number to be recorded.

Two things then happen. The top row of illuminated digits will show the quantity of goods then being placed in or taken out of stock and, the lower line of illuminated digits will show the number of items in stock under that particular catalogue heading *before* the new stock movement is recorded. The "Storekeeper" then calculates the new stock position and the electric typewriter then comes into operation and gives a typed record of these figures on the form that will have been inserted and for this purpose one half only of the platen is used, the second half being available for documentary typing. In the event of requiring, without movement of stock, to know what stock is in any or all of the catalogue numbers, this can be done by the use of the appropriate tabs and keys, each answer coming up on the lower line of illuminated digits whilst being typed on the stock form.



New Features in American Drawframe

THE newest M6 Even-Draft drawframe shown by Whitin Machine Works at the recent exhibition in Atlantic City, revealed further development of the company's vacuum cleaning system and other technical features. The vacuum extension is stated to be a major factor in making 600 ft./min. for carded work and 450 on combed work practical propositions. Emphasising that the higher production is made possible by the heavy, rigid construction employed, Whitin say that high speed drawing requires extreme rigidity, liberal use of anti-friction ball bearings and precision manufacture.

More than 5,600 deliveries of Whitin vacuum-cleaned drawing are now claimed to be in operation and on the new M6 the trumpet as well as the drafting system is included. According to a company spokesman this extension is needed to keep the area clean and free from lint and fly at high-speed operation..

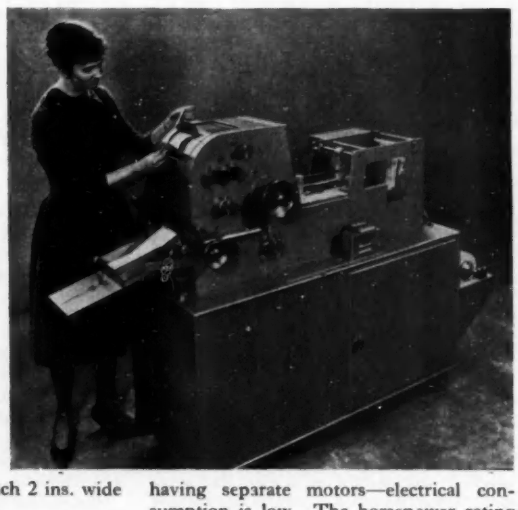
Another feature is the use of up to 18-in. by 42-in. coiler cans on a rotating can table to offer greater speed in doffing and creeling operations. A V-belt drive has been employed for the coiler tube gear, and anti-friction bearings are used on all rollers. The drive has a "soft-start reactor switch" to start the machine gradually, and an electronic stop is provided for the top rollers to stop the machine immediately in the event of a lap-up.

The Even-Draft drawframe is used as the first unit in the Whitin super lap preparation method, a new method of comber lap preparation offering higher production, heavier laps, and less waste. The four-over-five drafting mechanism has been retained. Large roller diameters are used, and the arrangement is designed to provide excellent flexibility and control over the full fibre range from $\frac{7}{8}$ in. to 3 in., including cotton, spun synthetics or blends. Appropriate settings for fibre length are achieved quickly and accurately, and the top rollers clearers are automatically adjusted when roller settings are changed. No change is required in the drafting system, tube gear assembly or tube gear size to switch from cotton to synthetics or blends.

Printing Hank, etc., Tickets

AT the request of a well-known hand-knitting wool manufacturer printing his own ball-bands and skein-tickets, Tickopres Ltd. have evolved a machine for producing, in workshop or office when and where they are actually needed, long and narrow labels or tickets. Slitting gear enables the machine to print several labels or tickets simultaneously side by side. Known as the Tickomajor, this newcomer prints or overprints labels and tickets of all sizes up to 12 ins. in length and 6 ins. in width. A rotary machine using handset type, slugs, plates or stereoes, its type-drum allows up to 60 lines of type to be printed or overprinted.

Printing on the reel, the machine is equipped with a guillotine that automatically snips off the printed labels. The guillotine has a traverse of 6 ins. Motorised slitting-cutters enable the printed web to be slit lengthwise, giving narrow labels or tickets of whatever size the user requires. Up to eight slitters may be used—producing, in this event, labels or tickets only $\frac{3}{4}$ in. wide. The use of two slitting-cutters, as a further example, would treble the output of the machine by allowing it to print and slit three labels each 2 ins. wide simultaneously side by side.



Operator checking the register of 12 in. wool ball-bands being overprinted by the Tickomajor

Output varies according to the size of the label but the machine attains a speed of 150 impressions/min. A high degree of inking efficiency is achieved by the ink-distribution system, replenishment being by means of an ink-duct. Although it is powered by three 250 v. a.c., single-phase motors—the unwinding and slitting gear having separate motors—electrical consumption is low. The horsepower rating of the motor for the main drive is 0·33, and the subsidiary motors are only 0·03 h.p. and 0·01 h.p. respectively. The controls are sited together on a panel on its left-hand side, and all operations (other than threading the reel of paper and making adjustments) are fully motorised.

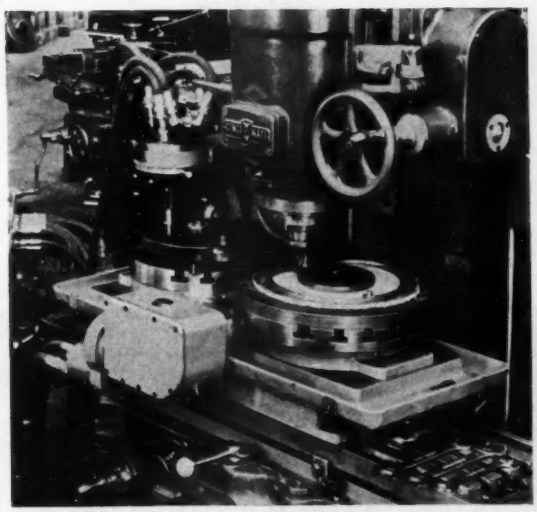
Double Hand Release for Brake Motion

Double hand release for stop-on-pick on the Dobcross loom

THE "Stop-on-Pick" brake motion introduced by Irvin Hudson Ltd., Ingleby Street Works, Bradford 8, last year for the Dobcross loom has proved to be a great success and over 1,000 units have been sold in all parts of the British Isles and in other countries as well. This motion, which is entirely mechanical, stops the loom in the event of a weft failure (either a breakage or the shuttle running out) well before the broken pick has been beaten-up into the fell of the cloth. The weaver does not have to find the pick, manipulate the dobby or the take-up; but merely to throw the shuttle across and continue to weave. Mending costs are reduced, quality is increased, waste is reduced and, since the weaver does not have to watch the shuttles, a number of firms are operating four Dobcross looms per weaver quite successfully with the help of this mechanism.

The "Stop-on-Pick" brake motion is now, however, available with a double hand release attachment which allows the weaver to release the brake from whichever end of the loom the shuttle may stop (see the photograph). This simplifies the weaver's job even more and, although this attachment started off as an extra, demand had been so great that it is now a standard fitting.

Hydraulically Operated Cam Milling Fixture



The "Cam-Master" mounted on a vertical milling machine

PROFILE milled cams to intricate contours are some of the most expensive items a textile engineer is likely to meet, who may only require one or two off each pattern. When George Hattersley and Sons Ltd., Keighley, introduced the outside cam treading motion on their silk and rayon loom last September, they had surveyed the market for suitable cam milling machinery to produce the 38 different cams which comprise the set. Ease of production of the necessary masters, and quick change from one type to another, were important factors to be considered.

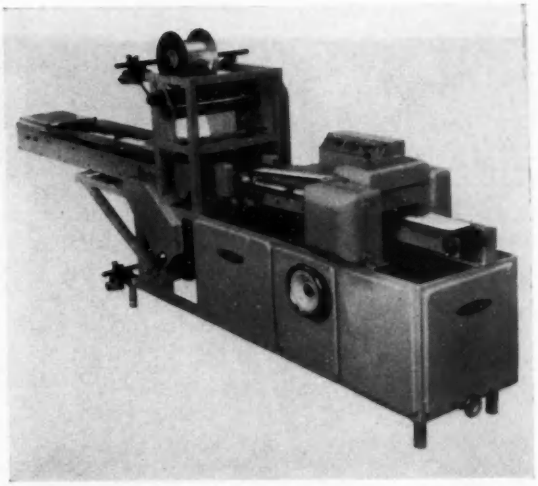
The Hayes "Cam-Master" milling fixture made by Hayes Engineers (Leeds) Ltd. was selected, and the unit is shown mounted on a Cincinnati No. 2.V. vertical milling machine. The unit consists of a bed carrying a horizontal table which in turn carries two synchronised circular tables. The workpiece is mounted on the right hand of these, and the master cam on the left. The horizontal table being under hydraulic pressure traverses to the left and keeps the hydraulic stylus in contact with the master, which is of thin section mild steel plate. Rotation of the tables is also controlled hydraulically.

A trolley, which carries this unit when not in use, also houses the hydraulic motor, cooling unit, filters, valves and controls. This can be moved away from the milling machine, when it is being used for other purposes. Hattersley state that they are in a position to undertake outside work of this nature, which can in certain circumstances be up to 17½ ins. dia. Cams can also be cut to metric dimensions.

Thixotropic Liquid Detergent Composition

A thixotropic liquid detergent composition consists substantially of a solution of 10 to 25% of an anionic synthetic wetting agent in a preferably aqueous, completely water-soluble organic carrier having a specific weight higher than 1 and consisting of at least two-thirds of a glycol with up to 4 carbon atoms and/or glycerol, which solution has a viscosity of 0·5 to 2·0 Poise, and a dispersed finely divided phosphate which forms water-soluble complexes with calcium. The phosphate particle size should not exceed about 30/μ, and not more than half the phosphate particles should have a size of up to 0·5/μ. The ratio between the phosphate and the wetting agent is 1 : 1 to 4 : 1. A corrosion-inhibiting silicate can be incorporated. (Germ. Appln. 1,074,187.)

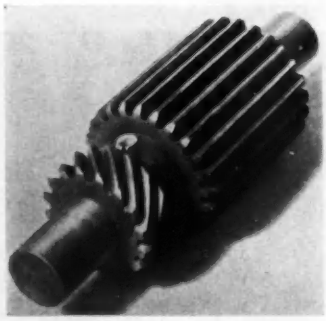
New Packaging Machine for Articles up to 1 in. Thick



The Flowpak 84E

THE Flowpak Model 84F is the latest in the Forgrove range. Of simpler construction than previous models—it has been specially designed to deal with articles up to about 1 in. (25 mm.) thick and wrap them in a heat-sealing material. The 84F is a continuous motion machine for wrapping products which can be carried between two layers of wrapping material by top and bottom propelling belts. Two types of infeed are available: one is for articles that are sufficiently rigid to allow them to be propelled by chain lugs and which will slide a short distance without being damaged; the other is for "non-slideable" products and has a bucket-type infeed.

The 84F produces a fin-seal type package, made by bringing together two webs of wrapping material, heat-sealing the side seams and then sealing the ends as it separates the individual packs. The end seals are made by rotary crimpers and crimp serations are in line with the package length. Packages can be produced in strip form. In this case the individual packages are only partially cut off, to enable the packers to split up the strips into suitable consumer units of six or some other convenient number of individual packages. This new Flowpak machine is especially suitable for wrapping shingled shirts, socks, underwear, silk stockings (wound on a card), gloves and other textiles. It is marketed by Forgrove Machinery Co. Ltd., Dewsbury Road, Leeds 11.



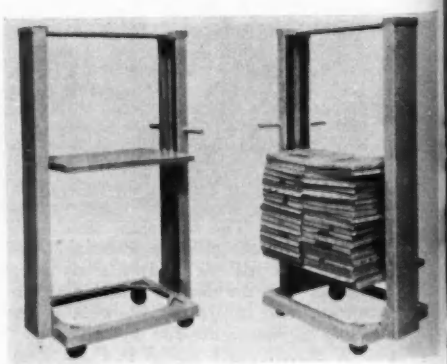
Self-Locking Steel Pins

A SELF-LOCKING carbon steel spring pin, appropriately named Sel-lok, has been marketed by Unbrako Socket Screw Co. Ltd., Burnaby Road, Coventry. Spring pins are already universally recognised as a very versatile and inexpensive engineering aid and the potential applications of Sel-lok, a cadmium plated product, are innumerable. They are already used in the assembly of projectors, switch gear, safety axes and pulleys, etc.

A feature of Sel-lok spring pins—available in a complete range of standard sizes—is the ease of installation. It is only necessary to drill a hole and drive in the pin. No expensive additional equipment is required. The chamfered ends of the pins make for easy driving and the bevelled slot edges prevent scoring. A pin can be removed and refitted many times without damage to pin or assembly.

When used as a pulley axle, the spring action has a cushioning effect which, if not required, can be reduced or removed entirely by inserting a further spring pin inside the first. This ensures rigidity and strength.

Mobile Trolley has Self-Adjusting Platform



Autolevel trolley

STATING that their new Autolevel trolley is an entirely new piece of materials handling equipment, Barron and Shepherd Ltd., 315 Kennington Road, London, S.E.11, point out that the platform of the trolley is suspended from springs so that as each layer of articles is placed on it the level falls proportionately, thus maintaining a constant working height for the operator. If the articles are removed the platform, of course, rises accordingly. One advantage, to which the makers draw attention, is that the operator does not waste effort in picking up and putting work down at floor level. In addition, considerable process time is saved and operators keep up with the rate of speed of their machines. The size of platform is usually 32 × 22 in., with a travel of about 26 in., but these dimensions can be altered within reason to accommodate different requirements.

THE TEXTILE
COLOURIST & FINISHER

Fibre Structure: Cotton

From recent research results it would appear that the usual processes of pressure boil and hypochlorite remove to a large extent the primary wall of the fibre and, if so, the technique should be modified unless there are good reasons to the contrary

SPECIALLY CONTRIBUTED

FOR many years, our studies of the surface structure of various textile fibres have been restricted by the well-known limitations of the optical microscope, but the increasing use of the electron microscope over the past twenty years has helped considerably in elucidating some of the details of fibre structure. Although the resolving power of the electron microscope may be about two hundred times that of the optical microscope, it possesses certain disadvantages in the studies of fibres; there is the difficulty that the fibres themselves are too large for direct examination and they are apt to be damaged by the electron beam.

Cotton may be broken down in various ways and whereas this is of great assistance in providing information on the nature of the fibre, it is of limited value in terms of the overall appearance. Accordingly, considerable attention has been devoted to the preparation of thin replicas of the fibre, often in polystyrene, which are metal-shadowed to bring out the structural detail; the impression is then coated with a film of a second material which reproduces the contour of the replica but is also sufficiently thin for examination in the beam.

The so-called gross structure of the cotton hair is well-known; it is a collapsed tube, the shape of which varies considerably along the fibre, as shown by reversals and other imperfections. Fig. 1 is characteristic of cotton hairs in the raw state and is an optical micrograph with an enlargement of 500 diameters. The marked area of one of the fibres, as indicated by the arrow, is a useful representation of the limited regions which can be seen by electron microscopy.

Fig. 2 is an electron micrograph of a portion of the raw cotton hair, at a degree of enlargement of 12,000 diameters.

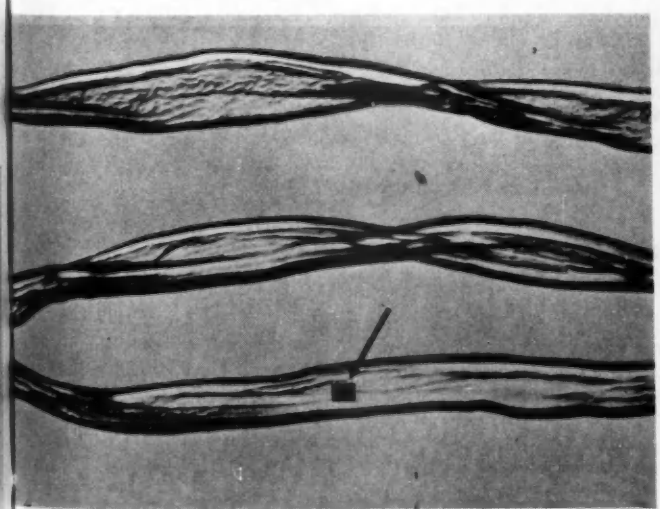


Fig. 1. Cotton hairs under the optical microscope; the indicated area forms the subject of the next illustration

Fig. 2. Part of an unscoured cotton hair as shown by electron microscopy

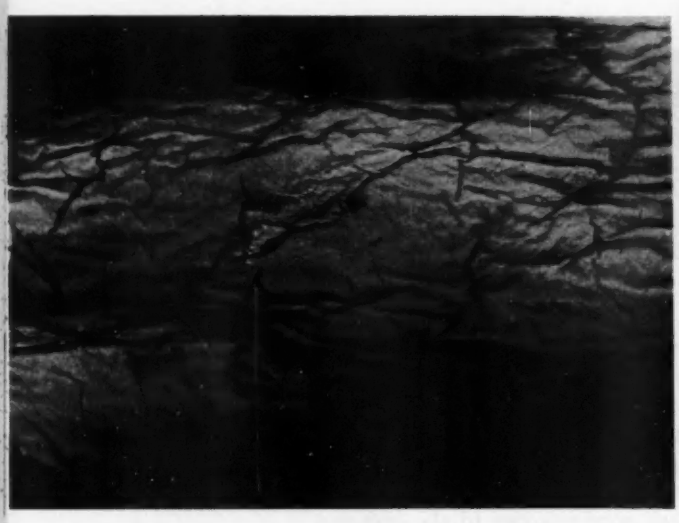


Fig. 3. Part of a cotton hair after scouring and bleaching as shown under the electron microscope

Fig. 4. Part of a cotton hair which has been subjected to enzymolysis to remove the primary wall

It will be seen that the outermost primary wall is rather smooth and flat, and only exhibits slight longitudinal furrows which are actually determined by the fibril bundles of the underlying wall. Fig. 3, also at an enlargement of 12,000 diameters, shows the surface of scoured and bleached cotton, from which the pectic material and cotton waxes have been removed; there are residues of the primary wall still existing. Fig. 4, however, is an electron micrograph of part of a cotton hair which has been subjected to careful enzymolysis. The structural basis of the fibre substance of the secondary wall is clearly revealed showing the manner in which the fibril bundles lie together.

Fig. 5 is an electron micrograph at an enlargement of 3,500 diameters of a number of raw cotton hairs in cross-section. The fibres have been previously swollen and the lumen or central canal, although collapsed, is clearly to be seen. The fibril bundles which constitute the fibre proper, are packed together in a very compact manner.

Damage to Primary Wall

Returning to consideration of the primary wall of the cotton hair, it is known that this is often damaged during the processes of scouring and bleaching. The actual effect can be demonstrated in a very striking manner by swelling in cuprammonium hydroxide; the swelling is not uniform but exhibits a characteristic effect on the fibre which resembles a string of beads as shown in Fig. 6 which is an optical micrograph with a degree of enlargement of 450. The annular constrictions are due to parts of the cuticle, the remainder of which has been ruptured by the swelling forces allowing the swollen cellulose to protrude as globules.

By careful scouring processes, however, it is possible to remove the waxes and pectins from raw cotton without much damage to the primary wall; hence in Fig. 7 it is possible to see the network structure of the microfibrils which constitute the primary wall or cuticle. The degree

(*continued on page 287*)

Fig. 5. Cross section of raw cotton hairs as seen under the electron microscope

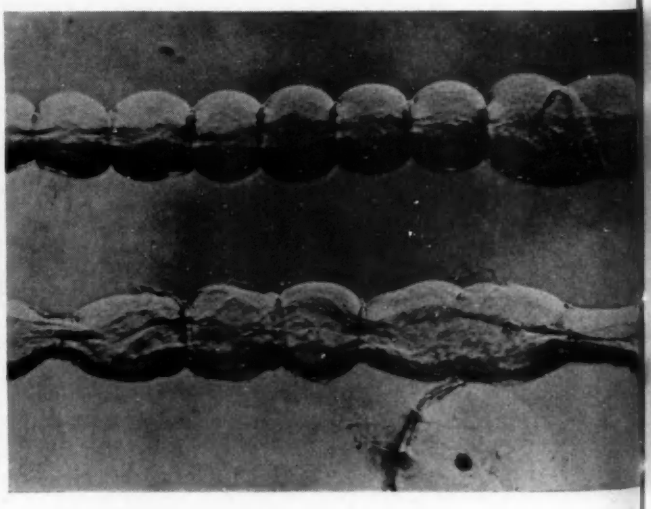


Fig. 6. Optical micrograph of scoured cotton subsequently swollen with cuprammonium hydroxide

Washing for Bleaching

In general, the trend is towards the totally enclosed type of washer for steam saving, with the use of the counter flow principle, to make the best use of wash liquors, together with various devices for reducing tension at high speeds

By "TECHNICAL CORRESPONDENT"

THREE general types of washer are used in conjunction with either continuous ranges or by the batch system in any type of bleaching arrangements with peroxide, hypochlorite or sodium chlorite. The old type of tight strand heavy roller mangle washer is being slowly superseded by the slack rope washing types and the tensionless types which are more and more being developed. The main advantages of the tight strand washer were high speed and efficient washing. The disadvantages were risk of damage to fabric, stretching and selvedge distortion or cutting.

Slack Rope Washers—These require less water, are easier on the fabric, but do not give such high speeds in operation. Washers of this type are also more difficult to operate, largely because of the greater risk of tangling of the material while in the wash liquor. The speeds of washing may vary from 65 to 150 yds./min. with increasing difficulty of operation at higher speeds. On the other hand, tight strand washers can be operated at 200 yds./min. for much longer periods without stopping.

Tensionless Washer.—Washers of this type use less water than either of the foregoing and do not stretch or damage the cloth and can be run for long periods at very high speeds up to 400 yds./min. Such washers are particularly useful when processing goods by the batch method, that is from kier to kier so that running out and running in times are reduced to a minimum.

Tight Strand v. Slack-Loop Washers

As already noted tight strand washing is much faster than slack-loop type but, in general, less efficient in washing out impurities. The reason, of course, is that the cloth is a very much shorter time in the wash liquor and passed through at a very much faster rate. Comparative speeds would be for tight strand washing 150 to 200 yds./min.; slack-loop 50 to 70 yds./min., and where double strands are passed through the washer simultaneously these speeds will be doubled. In the slack-loop washer the washing efficiency is increased, due to the much larger amount of cloth lying in the liquor at any given period, with the added benefit of agitation as the loops are drawn through the liquor by the nips of the washer.

Thorough washing prior to and subsequent to the kier boil will assist largely in the prevention of kier stains and in the production of better bleaching at later stages, due to the removal of matter which has a reducing or inhibiting effect on the oxidation processes used in bleaching. The usual type of high speed tight strand rope washer derives a good deal of its efficiency from the high speed at which it is operated. For example, the turbulence of the flow of water down the strands of cloth from the nip of the squeeze rolls has a very beneficial effect due to the high cloth speed and force of the water flow combined. This effect may be increased by directing the flow of entering liquor on to the cloth as it enters the nip of the wash rollers at a point where continual renewal of the wash water will be most effective. Similar action is obtained in the slack washing machine where the cloth passes through the nips and between guide pegs on a rail. In the slack washer, of course, the speed may be half or less than that of the tight strand roller washer.

Modern Washing Machines

The trend of modern thought on washing machines is towards the ideal of high speed and reduced tensions in washing with conservation of water steam and power. A modern rope washing machine which is claimed to be absolutely tensionless when running at a speed of 400 yds./min. with two strands of fabric uses conical rollers in the form of two inverted cones with their apexes running into the centre of the roller. As the machine is narrow and high there is a very fast flow of liquor down the upright strands of cloth during running. Wash liquor is used on the counterflow principle and it is claimed that weft distortion and loss of width are practically eliminated.

Open Width Pressure Washer.—Another development is the open width pressurised washer using two opposing jets of water between which the cloth passes. The wash liquor becks are alternated with scrays from which the cloth is drawn by nip rollers and the liquor projected from nozzles or slits across the full width of the cloth. These slits are opposed to one another on either side of the cloth as it passes between them and the opposing sheets of water at high pressure being intercepted by the cloth and meeting one another at the cloth surface generate a very high pressure with increased washing efficiency. It is pointed out that there is no tension on the cloth by the high velocity water issuing from the slits or nozzles as the pressure on the opposing sheets or streams of water is equal and opposite. Synchronised individual drives to each beck ensure freedom from build-up of tension and suitably placed guide and scrimp rolls keep the cloth at open width.

In general it may be stated that the trend is towards the totally enclosed type of washer for steam saving with the use of the counterflow principle to make the fullest use of wash liquors, together with various devices for the reduction of tension at high speeds. Other more advanced ideas which have not yet become practical possibilities are vibration of the wash liquor by supersonic means so that a high energy output is obtained from liquor particles at the fibre surface with increased washing efficiency. High speed mechanical agitation of liquor at the cloth surface is also a possibility and these new ideas when fully worked out may produce revolutionary results in the field of washing and detergency techniques generally.

Washing after Kier-Boiling

Washing of the boiled cloth after the kier boil can be a tricky business and various recommendations have been made to avoid kier staining. The addition of cold water should only be made after the kier has been flooded to the top for some time with hot water and run off by means of the air-vent. As the cold water is run in, the kier liquor is run off at the bottom so that the temperature falls slowly and pectic, waxy and other natural impurities are removed while the temperature of the liquor is still high, in dispersed and emulsified form.

The operation of washing in the kier may be assisted considerably according to Rupp[1] by the use of soap, provided none of the effect of the soap is lost by hard water or mineral constituents of the fibre. The use of sodium hexa-meta-phosphate is also recommended here as is also sodium meta-silicate as an addition to the soap solution. This author maintains that 5 to 10 lbs./soap per kier boil would do as much good as 50 to 100 lbs., provided the foregoing precautions are observed. It might also be added that the larger the quantity of soap in wrong conditions (such as hard water or mineral impurities) the greater the risk of staining, etc., by precipitation of insoluble soaps. The two main impurities to be removed from cloth by washing prior to oxidation bleaches are:—

(1) **Residual starchy matter which has been solubilised by previous desizing and alkali boil in the kier. This has a reducing action on oxidation chemicals, such as peroxide and hypochlorite, thus reducing their efficiency and using up much of the chemicals without any bleaching action on the cloth.**

(2) **Removal of residual alkali after kier boiling to ensure that this is not carried over into the peroxide bleach, in particular where it would tend to increase the rate of oxidation to the point where oxygen would be lost to atmosphere instead of being used for whitening.**

Washing and Scouring before Continuous Peroxide Bleach

In all cases it is essential to give a washing treatment before the continuous J-Box peroxide bleach by any of the well-known processes.[2] It is, of course, obvious that preliminary washing will remove a percentage of the starchy and mineral matter which would otherwise use up the peroxide in the actual bleaching process. The nature of the washing and scouring treatment will depend on the type and weight of cloth being processed.

For very light goods requiring only mild treatment generally a wash with water only is carried out prior to saturation by the peroxide liquor. Acid steeping is sometimes carried out by passing through a padder or saturator containing 0·2% of mineral acid, allowing the goods to lie in pile for a few minutes, followed by washing. For a thorough scouring treatment a 3 to 4% caustic soda solution is used with suitable wetting agents and the saturated goods steeped in a J-box for one hour. Again, acid steeping may be combined with caustic saturation and steaming in sequence with intermediate washing between the acid steep and the caustic treatment.

In general it may be stated that the more thorough the preliminary washing treatment in any bleaching operation the lower the chemical costs in terms of peroxide, hypochlorite, etc., as well as reduced washing costs subsequent to bleaching.

The speed of a continuous bleaching range is largely controlled by the speed of the intermediate washers. With the latest type washer it is estimated that speeds of up to 300 yds./min. can be attained at the washing stage. The first washing takes place after singeing and desizing and on leaving this stage the cloth water content is reduced to about 80% by passage through rubber squeeze-rolls.

After saturating the cloth with caustic soda of appropriate strength and then through the heater tube into the J-box, it is heated in this latter equipment for 1 hour. The cloth is then withdrawn by the washers and the caustic content reduced to 0·2% and the moisture content again reduced to 80% prior to entry into the peroxide stage of bleaching. Saturation with peroxide bleach liquor to about 100% on cloth weight is then carried out prior to a further J-box treatment for 1 hour. Following this the cloth receives one final wash through one machine, as by this time the content of impurity is very low.

Automatic Control.—In all types of washer where long runs of cloth are involved the control of steam-flow and water-flow are both of first importance. A fully automatic system includes control of flow and temperature of both steam and water with recording if required as well as control of the load on the mangle rollers of the washers. Such methods as this are essential in operating very long runs of cloth on the continuous J-box system, otherwise steam and water costs would tend to get out of hand.

Rinsing After Peroxide Bleach

In experiments by Kollmann[3] it was shown that thorough rinsing after the peroxide bleach will remove any possible risk of formation of oxy-cellulose on storage. The yarn will only be weakened if the goods are not rinsed at all after bleaching (13·2% loss) or are not sufficiently rinsed (loss 10·4%). In both cases after long storage slight traces of active oxygen are still present. On the other hand, thorough rinsing after bleaching removes the risk of tendering as the goods are free from oxy-cellulose and show no traces of active oxygen after several weeks.

In normal rinsing there will be very slight traces of active oxygen left in the goods which will disappear on drying or short storage. The conclusion is that, in general, weakening of the fabric can only occur in extreme cases where the washing process has been very inefficient.

Use of Sulphur Dioxide

The following information on the use of sulphur dioxide is given by Eldridge in a paper read to the American Association of Textile Chemists and Colourists some years ago, and reported in the "American Dyestuffs Reporter" (cutting undated). This author points out that because of the very positive action of sulphur dioxide as a sour or anti-chlor, it has been found practical in many cases to cut down washing and in some instances actually eliminating one wash either before or after the application of the sulphur dioxide.

It is noted that souring with mineral acid does not neutralise the residual chlorine but activates it rather, and in spite of subsequent washing in many cases the test for chlorine will still reveal its presence. On the other hand, sulphurous acid, that is, an aqueous solution of sulphur dioxide, attacks the residual hypochlorite in the fibres with complete neutralisation of free chlorine. This reaction produces sodium chloride and sulphuric acid which latter would appear to be an element of danger. The concentration of sulphuric acid is, on the other hand, so small that it comes into operation as an additional sour to neutralise residual alkali in the goods. The following advantages are listed:—

(1) **Instantaneous neutralisation of residual hypochlorite.**

(2) **Neutralisation of excess sulphurous acid before the goods are completely dried out.**

(3) **Elimination of tendering.**

(4) **Reduction of inert salts to be washed out.**

(5) **Softer goods when finished.**
(6) **Reduced washing and safer handling.**

Powers of Suspension in Detergent Solutions

It is well known as the result of many studies on detergency that certain assistants used as alkalis and detergents in wash liquors react very differently and in fact increase the deposition of soil particles in material which has been washed. For example, Powney and Noad (Jnl. Text. Inst. 1939, 30, T175-171) used desized cotton fabric which was immersed in 0·1 ilmenite particles suspension and shaken for 20 mins. Deposition of the particles on the material with resultant darkening was then measured with a photo-electric photometer and compared with brightness values used in a similar suspension in pure water. These and similar studies revealed the fact that an addition of simple alkalis in the form of soda ash or caustic soda to aqueous liquors or soap solutions brought about increase of deposition of particles as a result of the specific effect of the sodium ion as distinct from any effect of the pH value.

On the other hand, the addition of silicates and phosphates brought about decreased deposition a protective action which was attributed to selective adsorption of the anion. Sodium hexa-meta-phosphate and sodium pyrophosphate give a protective action which was noticeable at concentrations as low as 5 to 10 parts per million. Sulphonated fatty alcohols had also the effect of decreasing deposition, and it was noted that the greatest effect was obtained at concentrations which decreased rapidly as the chain length of the soap fatty acid increased. The protective action of the long-chain alkyl sulphate type of detergents was comparatively low.

Detergent Solutions in Washing

According to Nordfeldt B.P. 561542 the use of peptone instead of soap gives a very efficient detergent solution. It is pointed out that one part of peptone to 30,000 parts of water (3,000 gallons) has the effect of reducing surface tension by 40% with the production of a detergent solution as efficient as soap with none of the disadvantages of soap. In using with vegetable fibres washing in this solution should be followed by another wash with a small percentage of soap or alkali.

Estimated Water Consumption

The following table[4] based on cotton goods weighing 4 ozs./yd. will give some indication of the amount of water required in washing for bleaching, using the continuous peroxide method at 100 yds./min.

Equipment	Water Galls. per hour
Desize saturator ..	650
Rope washer	6,000
Caustic saturator ..	657
Rope washer	6,000
Peroxide saturator ..	650
Rope washer	6,000
Rope washer	6,000
Total	25,950

References

(1) Rupp. Bleaching Cotton Piece Goods with Hydrogen Peroxide (Dyer and Textile Printer, Dec. 20, 1935, p. 585).

(2) Staff (B.E.C.C.O.). Continuous Peroxide Bleaching (Amer. Dyer Rep., 1944, p. 33, 345-346, 365-368, 380, 385-388, 401-402, 405-407).

(3) Kollmann. Weakening of Cotton with Hydrogen Peroxide (Dyer, Sept. 15, 1933, p. 285).

(4) Anon. Water Consumption Table (Tex. Wor., Sept., 1954, p. 131).

Fibre Structure: Cotton

(*continued from page 284*)

of enlargement is 20,000 diameters. From these and other results it appears that the usual processes of pressure boil and hypochlorite bleach remove the primary wall to a large extent and should be modified unless there are good reasons to the contrary.

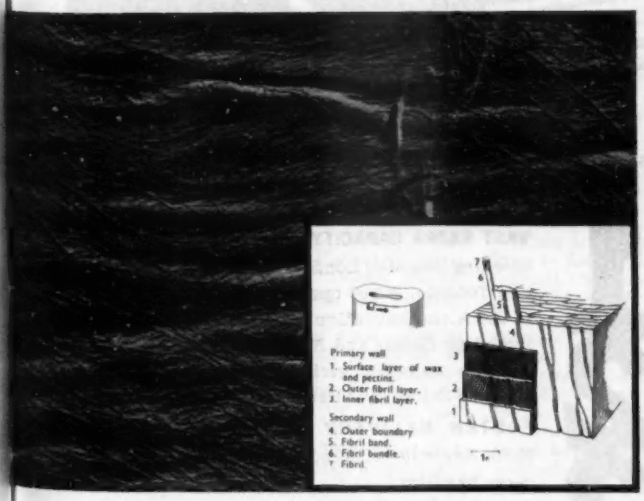


Fig. 7. Electron micrograph of the primary wall of cotton, accompanied by a diagrammatic reconstruction of the various elements of the cotton hair

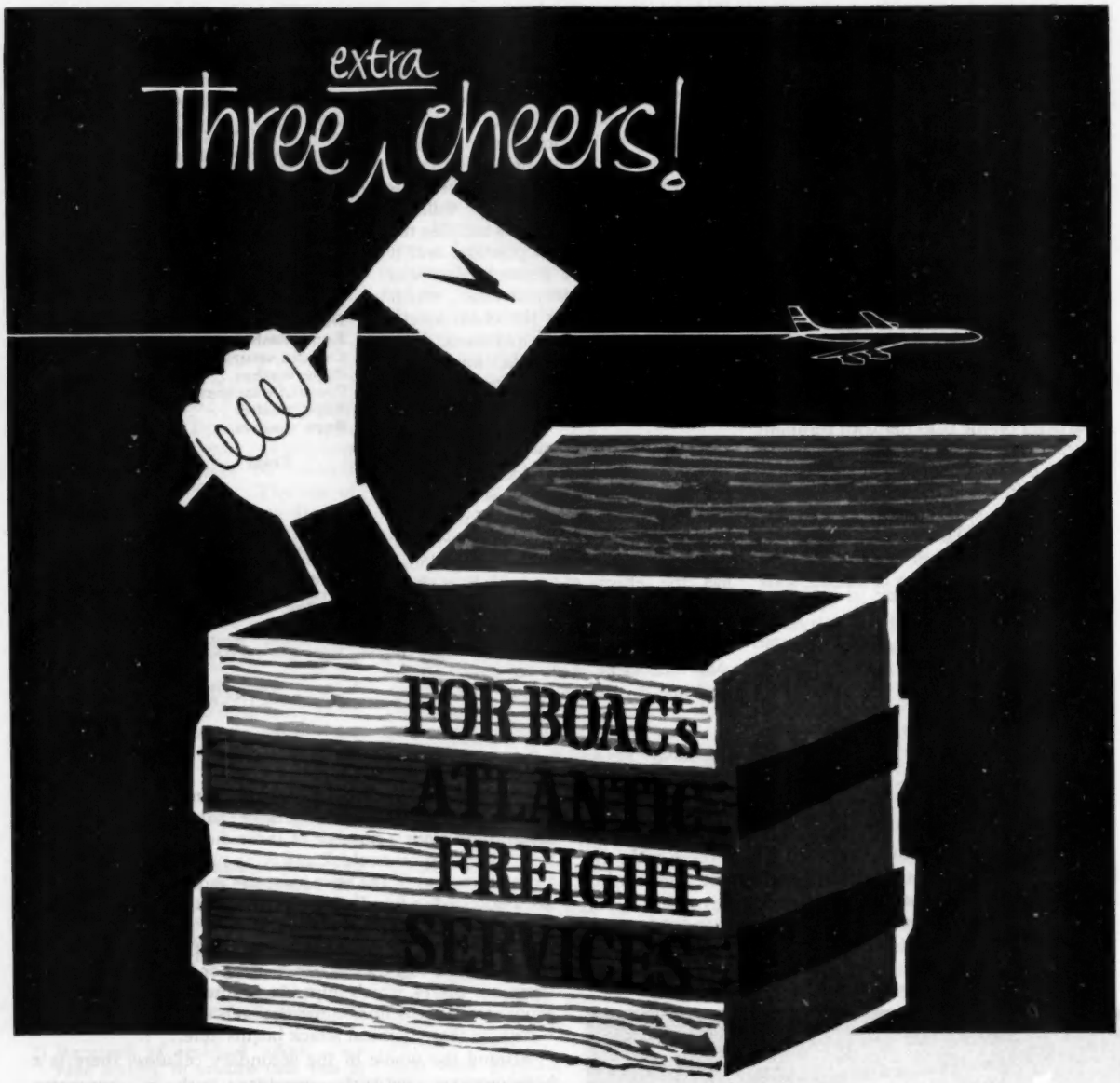
It now seems that the structural elements of the secondary wall which comprises the greater part of the fibre are constituted from a number of individual microfibrils about 0·01 to 0·02 microns thick and lying parallel to one another in the direction of the fibre axis; the individual microfibrils are associated in bundles of 100 to 200 to form groups about 0·1 to 0·2 microns in thickness, lying at a slight inclination to the fibre axis and following the twist of the hair. The bundles come together in bands of 10 or 20, between which there are places which appear as rather deep longitudinal grooves where the fibre construction is somewhat loose, and it may be that chemical attack begins here.

Around the whole of the secondary cellulose there is a homogeneous network structure with a transverse orientation and this is sometimes termed the winding layer on that account; this, in turn, is covered by the outer network of the primary wall which tends to have a longitudinal orientation. Both of these networks are embedded in wax and pectin. The general arrangement is illustrated in the model picture which forms part of Fig. 7.

The optical micrographs and the electron micrographs are due to Dr. Kling and Dr. Mahl; they are reproduced by permission of Bohme Fettchemie of Dusseldorf, Germany.

Wool at Canadian National Exhibition

Wool carpets, fabrics and high-class knitwear will be among the 200 examples of well-designed British products to be included in the Board of Trade's stand at the Canadian National Exhibition, Toronto, from August 24 to September 10. Exhibits have been selected by the Council of Industrial Design.



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Reviews

GRUNDLAGEN DER TEXTILVEREDLUNG (Fundamentals of Textile Finishing). By Dipl. Chem. M. Peter. Dr. Spohr-Verlag, Westrasse 66, Wuppertal-Elberfeld. 1960. Pp. 416 (price DM. 10.80).

In the revised and amended eighth edition this well-known German book gives a comprehensive survey of textile processing from yarn or fabric to the finished article. After describing preparatory processes for cotton, wool, cellulosic and synthetic fibres, the book deals with bleaching, dyeing, printing and finishing of natural and synthetic fibres.

All types of finishes are mentioned and explained, particularly those which increase the wearability and use, viz. flame-, shower-, rot-proofing, anti-static, anti-soiling finishes, with the increasing interest in special fashion effects obtained by mechanical and/or chemical treatment. The section on crease-resist, non-iron, wash-and-wear and similar finishes is particularly interesting, with a description of machines used in the production of such finishes. Many practical hints are given, also to avoid faults and damages.

In an appendix lists of dyestuffs and textile auxiliary products are given, also of German and foreign textile machine makers, and there is an alphabetical list of auxiliary products grouped according to their uses. The book is well printed and produced with many instructive illustrations, including the latest developments and techniques in textile processing and finishing, is extremely interesting and readable.

B.S.

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MODERN PRINTERS YEAR BOOK. Bendles (Torquay) Ltd., 15-16 George Street, Torquay (price 6s.).

The 1960 edition of this useful pocket-size compendium is little different from previous years, the usual wealth of invaluable information being presented in an easy-to-find manner. One noteworthy change has, however, occurred: the Branded Papers section has been revived and completely recompiled, and to make room for this the Letterpress Machine Specifications section has been omitted. In addition the Directory of Suppliers has been brought completely up to date.

• • •

BRITISH PLASTICS YEAR BOOK, 1960: A Classified Guide to the Plastics Industry. Iliffe and Sons Ltd., Dorset House, Stamford Street, London, S.E.1 (price 42s.).

Each issue of the year book since its introduction in 1931 has increased its usefulness to both manufacturers and users of plastics and plastics products and the latest edition fully lives up to the high standard thus set. The opening section contains a glossary of technical terms, followed by tables of plastics properties, a list of companies registered in 1959 and a list of relevant British standard specifications. In Sections 2, 3 and 4 are found classified lists of raw materials used in the industry and similar lists of manufactured products and of engineering and chemical equipment, plant and services available. Each of these lists is preceded by an exhaustive index. A list of proprietory names contains, in addition to the trade names, definitions of the products, the names of the manufacturers concerned, the countries of origin being indicated where the manufacturers are overseas. Sections 6, 7 and 8 list names and addresses of manufacturers, organisations, consultants, and periodicals both in the United Kingdom and overseas and contain a Who's Who of prominent people engaged in the British plastics industry. The final section tabulates technical and general data relating to plastics and related products.

S.P.S.

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THE OLDER WORKER AND HIS JOB. Published for D.S.I.R. by H.M.S.O. (price 1s. 3d.).

With the proportion of older workers in industry increasing it is vitally important for our economic progress that their skill and abilities are used to the utmost advantage. This is one of the outstanding points in a review by the D.S.I.R. of recent research in this field. The review summarises the advantages that come with age such as increased experience, accuracy, loyalty, reliability. It also describes the changes, both mental and physical, which decrease individual efficiency.

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COTTON FABRICS FOR RUBBER FOOTWEAR. British Standards Institution, 2 Park Street, London, W.1 (price 3s.).

Several major differences distinguish the revised B.S.1167 standard from previous editions. The number of standard constructions has been reduced from twenty-three to fourteen. Eight of these were specified in the 1948 edition, but six new ones have been evolved from a comprehensive review of other fabrics currently being manufactured, and are specified in terms which will admit most of the cloths whose application in the manufacture of rubber footwear is established in trade practice. All the standard fabrics are now described on the basis of minimum physical properties for loomstate condition.

• • •

MISES AU POINT DE CHIMIE ANALYTIQUE PURE ET APPLIQUEE. By Prof. J. A. Gautier (edited). Masson et Cie., Paris 6. 1959. pp. 230 (price Fr. 4.800).

This seventh series of methods of chemical analysis contains in the third chapter (pp. 58-144) a contribution by J. Kiger on modern methods for the identification of natural and man-made fibres. After describing the chemical constitution and properties of textile fibres, he outlines the physical and chemical methods for fibre identification and the microscopical qualitative analysis as well as staining methods. The colour effects obtained with certain dyestuff reagents are reproduced on a separate table, and there are a number of microphotos and illustrations. The analysis of fibre mixtures is also described, together with analytical tests for finishes; there are even methods given for the separation and identification of four and more fibres. There is also a comprehensive list of references. This section is extremely well written and should be particularly interesting to those with a knowledge of French.

B.S.

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MADE IN NEW YORK. By Max Hall (edited). Harvard University and Oxford University Press. 1959. Pp. 388 (price 54s.).

This is one of the series of books on the forces that shape metropolitan areas, and has to do with the largest and most complex metropolitan area in the U.S.—the New York Metropolitan region. It was aimed to analyse the key economic and geographic features of this region. The authors examine three of the region's key industries: women's and children's apparel, printing and publishing, and the electronic (radio) industries, which altogether employ about 28% of the manufacturing employees of the region.

These three industrial groups are thoroughly studied and investigated, and the observations and results form the content of this volume, with many statistical graphs and tables. There are also trade projections through 1985 for the three industries; but scientific and technical developments—particularly in electronics—are unpredictable, and developments in electronics will certainly affect many other industries. The book should interest the sociologist and economist.

B.S.

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DETERMINATION OF BREAKING LOAD AND EXTENSION OF STRIPS OF WOVEN FABRIC. British Standards Institute, 2 Park Street, London, W.1 (price 3s.).

This new edition of B.S. 2576 makes provision for strength tests by means of both constant-rate-of-loading (C.R.L.) and constant-rate-of-traverse (C.R.T.) machines. When the standard was first published in 1955, C.R.L. machines only were specified, since they were considered less subject to error than others in common use and therefore more appropriate to a formal test method. The new publication specifies general requirements for all machines; additionally, it prescribes a breaking time of 60 ± 10 secs. for C.R.L. types, and rates of traverse of 2 ± 0·25 and 4 ± 0·5 in./min. for C.R.E. and pendulum types respectively. The preparation of test specimens and test procedure and calculation, and expression of results, are described in detail.

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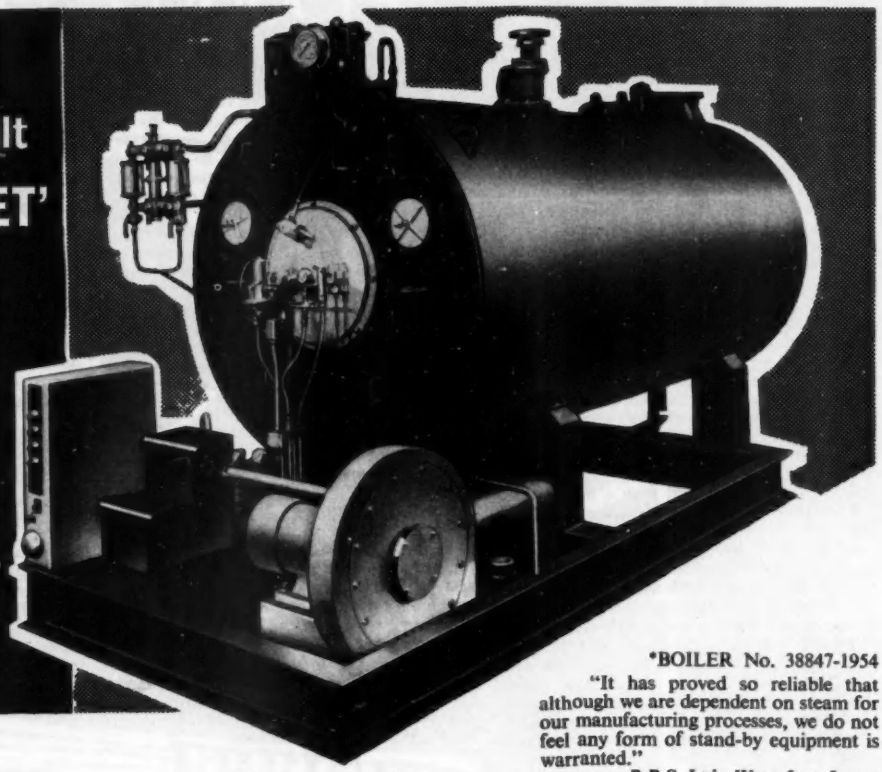

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Textile Trade and Prospects

Cotton Trade: Yarn and Cloth Activity

In the last few weeks most spinners and manufacturers have been fully engaged to get maximum output to fulfil old contracts. Apart from problems in pacifying customers, management is still not satisfied with the inadequate labour position. In addition to the worries associated with the machinery scrapping programme the industry also finds itself gravely short of the right types of operatives to run the existing machinery. Similarly, there is a natural resistance to night-shift working and drift to other industries has not been in small proportions. With the cotton trade holidays now under way, it is surprising that there should be such a volume of good inquiry and firm business. Having once had to face up to interrupted deliveries in many instances, a number of manufacturers and converters are now anxious to avoid further hold-ups in their annual schedules.

On the spinning side, inquiry has covered every type of count and quality available. There is a much more realistic atmosphere in present business dealings and, although there are complaints at some of the margins, spinners on the whole keenly appreciate the co-operative attitude in finalising tentative approaches. The bulk of the business put through has, of course, been on home trade account, the greatest weights being in medium twists on ring-beams, cop, cone and cheese. Doubling wefts and hosiery numbers in single and plied counts have been well supported, and coarse counts and condenser types remain in very good demand. Interest in fine yarns has eased a little but blended qualities and fancy, novelty effects are well booked for months ahead with, in some cases, delivery dates moving still further ahead. One pleasing feature about this more encouraging activity is the corresponding drop in complaints aimed at getting concessions in prices. It is strange that bad trade should inevitably bring on this abominable practice.

Inquiry for cloth maintains the high levels of the previous three or four months. Discussions on forward account have been extremely encouraging and most manufacturers report increasing pressure to accept new accounts whilst fully engaged with their old customers. Most of the business negotiated has been on apparel cloths—mainly cotton and rayon staple—in a wide range of dobby and jacquard patterns and novelty weaves, also attractive screen and roller printed cloths. Cloths featuring blended yarns attract ready buyers and imaginative designing certainly plays a large part stimulating interest. Furnishing fabrics are in keen request in a seemingly limitless variety of distinctive dobby and jacquard designs in traditional and contemporary styles, using the full advantages offered by weft-mixing with appropriate warping arrangements. Household textiles are enjoying a much better off-take. Quiltings, sheetings, table cloths and cotton blankets are in good demand. Towels in medium and top-class price brackets sell steadily and again, excellent design applied to the right colours, has done much to improve this market. There has not been much improvement in export activities, although one or two Dominion outlets have taken slightly higher quantities of cloths.

Wool Trade and Stocks

A recent survey by the Bank of New South Wales revealed that the value of Australia's imports from Japan had increased more than 30% since the mutual trade agreement was signed in 1957. The value of exports to Japan decreased slightly in the first two years of the agreement due mainly to a drop in the price of wool—Australia's chief export to Japan. In the first six months of the current financial year, Japanese authorities increased the exchange allocation for wool by 50%. The Bank reports that while the composition of Japanese imports had changed in the past three years, some sections of the Australian manufacturing industry still found competition from these imports an imminent and drastic threat. The review points out that voluntary restrictions have been imposed by the Japanese authorities and notes that there are encouraging signs that Japan is anxious to develop an enduring trade in commodities which are not subject to restriction on account of the impact on Australian industry.

According to a recent report, Australian wool sales this season are almost certain to exceed 5,000,000 bales. Sales to the end of May totalled more than 4,500,000 bales and by the end of June the figure should have increased to just over 5,000,000, states the firm. However, the season this year would extend into July, and the total sales for the season should eventually reach 5,140,000 bales. There were 135,000 bales to be sold in Sydney before the end of the season, 75,000 in Newcastle (Australia), 135,000 in Brisbane, and 270,000 bales in south Australian centres.

Australian trade with the Soviet Union has increased this year since the resumption of diplomatic relations. In the 10 months to April, Australia exported nearly £9·6 million worth of goods to Russia. In the corresponding period last year exports were negligible. Imports from Russia are still small—only £364,000 for 10 months. Nearly all the increase in exports was due to Russian wool buying. Next year East Germany will purchase Australian wool worth £8 million as compared with £1·2 million in 1959. This was announced in Sydney recently by East Germany's director of wool buying, who said that his recommendation that East Germany should continue to buy wool through auctions in Australia had been accepted.

U.K. wool stocks at April 30 are disclosed by the Wool Industry Bureau of Statistics at 235·1 million lbs. (clean weight), which is 0·3 million lb. lower than a month earlier and 34·7 million lbs. less than at April last year. Two-thirds of the decline compared with a year ago is in merino qualities and the balance in other sorts. Reduction in wool stocks is balanced to some extent by an increase in stocks of merino-quality wool tops (i.e., combed wool). At April 30, these totalled 74·4 million lbs., or 9,000,000 lbs. more than a year ago.

Linen Trade Review

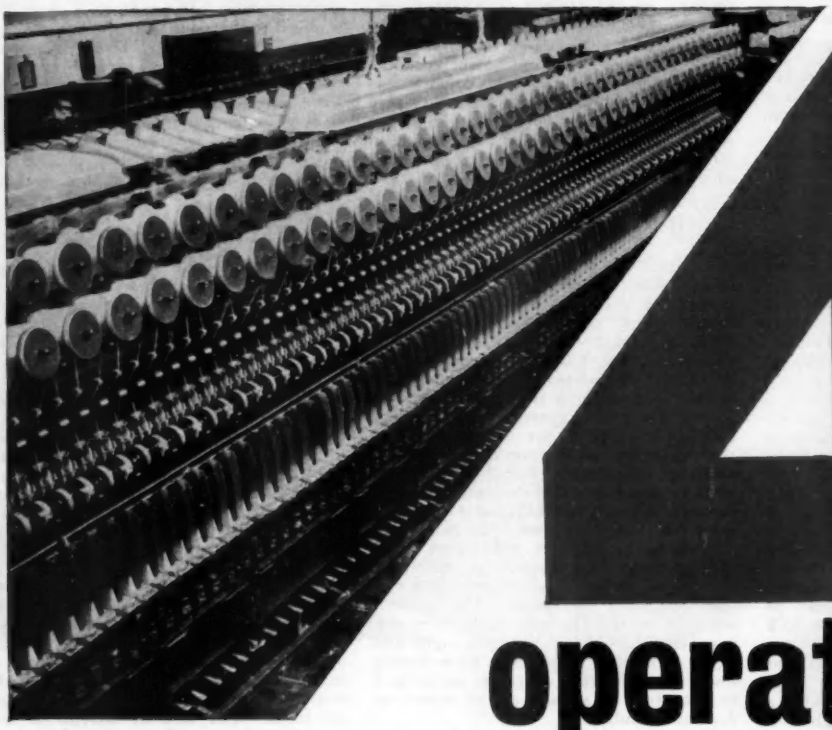
With the decline in the buying boom which had concentrated all effort on urgent problems of supply during the early months of the year the old problems concerning survival in an overcrowded market are presenting themselves once again for solution, and with a greater sense of urgency. Foremost among them is cost. Despite the considerable progress in textile machine design and performance, as well as in processing techniques, these have had limited application in the linen industry, partly by reason of the specific processing requirements of the raw material, and largely because of aversion to change on the part of many manufacturers.

The British industry has ceased to exist as a separate entity with exclusive markets. The latter have been invaded in every sphere by cotton and man-made fibre products, individually and in blends, and unless it can match its pace to the rate of technical progress in these sections of the textile industry its prospects for the future are bleak. The lack of interest of mill executives in general in technical progress is evidenced by their absence from exhibitions, such as that at Milan last year, and the more recent one at Atlantic city. It may be said in defence that these have had little of direct interest to linen manufacturers, and particularly to flax spinners. They are, however, a fruitful source of ideas which may be modified to suit the particular requirements of the trade, with a view to bridging the gap between the selling price of its end products and those of its competitors.

To be fully effective any modifications in existing practice must have regard for modern trends in the retail market. These include small stocks with quick turnovers and short term ordering with emphasis on delivery. Current interest combines novelty with quality, with emphasis also on selling price. All these factors demand flexibility in production, which depends as much on processing technique as on the machinery used.

The need to find a solution to advancing production costs is emphasised by the upward trend of wages. During May operatives in the bleaching and finishing sections received increases of 5s. 2d. per week for men, and 3s. 6d. per week for women, with proportionate increases for juvenile workers. An application for a wage increase in the spinning section is being considered at present by employers, together with one for a reduction of the

Top to yarn in....



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working week from 45 to 40 hours, this being claimed for all sections of the trade.

The British linen industry is facing increasing competition in all its export markets, most of it coming from low cost countries including Japan and China. This is confined at present to low and medium grade household goods, but the quality of product compares favourably with a similar British article, and the selling price is substantially lower.

The question of raw material supply continues to dominate the activities of the industry as a whole, and will undoubtedly determine its future progress. That the tail should be in a position to wag the dog—particularly when the latter has ceased to be able to control its appendage—is a major misfortune. The domestic flax crop in 1960 is more nominal than actual, and it is insufficient to provide a buffer in the event of price exploitation by overseas suppliers. Official figures are not yet available regarding the acreage grown on the Continent this year, but the total is expected to exceed that of 1959. Reports from various centres indicate that the crop generally is making good progress in favourable weather conditions. The high percentage of white flower strain seed sown suggests little prospect of improvement in fibre quality.

With labour concentrated on retting and straw handling little work is being done in the scutch mills, so that the volume of fibre on offer is insufficient to test the market. The quality generally is low with prices unchanged, Courtrai "C" grade being quoted around £180, and Lin Brise £150 per ton. Exports of 1959 crop Soviet flax have practically ceased, and little long fibre can be expected from this source until the 1960 crop is available. Some Ralo tow can still be bought on the basis of £118 for No. 6 and £128 for No. 8.

Spinners are still fully engaged on orders booked earlier in the year and would welcome further commitments to maintain production into the autumn buying season. Exports continue to absorb an important percentage of the total production, with West Germany the leading customer. Total exports for the three months ending March 31 were valued at approximately £600,000. Despite the competition of man-made fibre products sales of linen thread have been well maintained. B.O.T. returns value these at around £277,000 during the corresponding period.

Cambric manufacturers have welcomed the upturn in demand for handkerchiefs, the export figures for the first three months of the current year, at 193,818 dozens, being approximately 18% above those for the corresponding period last year. Most classes of household linen goods also showed a corresponding advance on the previous year's totals over the period. The returns for industrial fabrics was disappointing, registering a decline of 15%.

Jute Fibre, Yarn and Fabrics

Although prices of raw jute are still very high, there has been an easier trend of late. The better reports regarding progress of the new crop are responsible for the quieter market and an easing of prices. However, this has had little influence on the old crop position as stocks.

Offers of new crop material are rather scarce with prices irregular. With the approaching end of the season odd quantities are being offered at under the generally quoted rates. Mill Firsts were available at £148, Mill Lightnings at £137, Mill Hearts at £135 and grade Hearts at £132, c.i.f. U.K., for June/July shipment. Some small parcels were secured by Dundee spinners at these price levels. Offers of new crop are being more freely made but a wide range of prices are quoted depending on shipment. With the crop being late, the near position is commanding a substantial premium as the quantities available for early shipment will be small. Mill Lightnings were offered at £131 and Mill Hearts at £126, c.i.f. U.K., for July/Aug. shipment, at £125 and £120 Aug./Sept., at £121 and £116 Sept./Oct., and at £118 and £113 Oct./Nov. New crop grade Tossa-4 was named at £120 Oct./Nov.

Spinners are anxious to place contracts for early shipment raw material but refuse to pay the high rates asked. There is always the possibility that after paying the higher rates shipment could be delayed due to the non-availability of fibre due to the late harvest. Dundee spinners cannot remain out of the market indefinitely as raw material consumption is at a very high level with mills and factories running at full capacity. The quantity held in Dundee may be sufficient but the selection of the various grades of raw jute will require some augmenting before bulk supplies of new crop become available. Supplies of old crop dark jute are difficult to obtain with grade Tossa-2/3 offered at £147 and grade Tossa-4 at £141 10s. with Dacca Tossa-4 at £160 and Dacca Tossa-6 at £148. Continental Tossa-2/3 is offered at £140, June/July. Prices of cuttings have become easier and offers are being made at the E.P.C. levels of £80 for S.N.C. and at £68 for N.C. June/July. New crop N.C. was available at £60. The general feeling is, if the present type of weather continues in East Pakistan, the crop although much later than usual should provide sufficient fibre for all consuming countries. A certain amount of anxiety will exist until the crop has been harvested but given average conditions there is no reason why prices should not return to a more realistic level.

The Calcutta goods market has reacted fairly sharply to the better new of the raw jute crop. Prices have fallen for both hessians and sackings but they are still well above the level ruling at the beginning of this year. The Indian mills have not increased production as announced earlier and it is their intention to allow mills to restrict production during the coming months due to the expected shortage of raw material. However, any reduction in output during July, August and September can be made up later in the year. This position is reflected in the prices being quoted with a considerable discount being offered for Oct./Dec. shipment.

Quotations are at 74s. 3d. for 10 oz. 40 in., and at 56s. 9d. for 7½ oz. per 100 yds. f.o.b. Calcutta for June shipment, at 74s. 9d. and 56s. 9d. July and also Aug./Sept. and at 71s. 9d. and 53s. 9d. Oct./Dec. "B" twills are at 206s. 3d. June, at 206s. 9d. July, at 207s. Aug./Sept. and at 197s. 3d. Oct./Dec.

During the period of very high raw material prices, the selling rates of yarns and cloth were advanced considerably but not to the same extent as raw jute. This fact brought out a good deal of buying as a considerable fall will have to take place in jute values before any reduction can take place in yarn and cloth rates. At present a good deal less business is being placed but this is only to be expected. Spinners and manufacturers are very busy with previous orders with their works running to the full capacity of the labour available.

The flax trade in Scotland is quieter so far as new business is concerned but spinners and weavers are fully employed with previous orders. However, the outlook for the future is quite bright as a good inquiry is being made and further tenders are expected fairly soon for substantial quantities. Little change has taken place in raw material values during the past month.

Silk and Man-Made Fibres

Business is quite good in most sections, despite a heavy demand on certain qualities of yarns. On the whole there is a steady delivery and few reports of any large-scale hold-up because of deliveries. Demand for acetate and plenty of firm business is being booked for autumn delivery. The prevailing fashion note is very much for filament yarns in a variety of fibres, acetate, viscose, nylon and "Terylene," some for blended fabrics, others in 100% form. The dress trade has probably been as brisk as at any time since the war. Demand for staple blended yarns for the shirting trade is very good, and a good deal of experimental work is being done in 100% filament viscose which, specially finished, is said to have good performance values in wear-tests.

On the Yorkshire side, there are reports of more installations of knitting machines, and the development of a knitting industry in the West Riding now seems to be a fair assumption of recent trends. Meantime, all-wool yarns are in heavy demand for the West Riding trade, although for the Midlands there is a call for spun nylon and "Terylene." Despite the requirements of the industry in respect of all-wool, "Terylene" and wool blends, worsteds, and also wool and "Acrilan," and, in the cheaper suitings, wool and viscose rayon, are a strong feature of this market.

Throwsters report plenty of forward booking at present and indeed the general tenor of business is for order books to lengthen still. Silk yarns are in growing demand, so much so that some throwsters estimate one-third of their throughput is for this fibre.

The acrylics, too, are wanted in steady quantities, and the demand for "Courtelle" increases steadily. Most classes of narrow fabrics are in request with nylon, and figuring prominently in many types of smallwares and cord, laces, etc. Braidings in traditional styles, and gimps, petershams and the like are all in much more noticeable demand today than a year ago.

Commission dyers and printers find business increasingly competitive and margins very tight. In the Macclesfield area, there is renewed activity by screen printers, and the call for tie fabrics, handkerchiefs and screen printed styles increases. Knitted fabrics of all descriptions are in exceptional demand with the styles varying from simple outerwear to extremely attractive warp-knit jersey fabrics. The growth of the warp-knit industry is a very encouraging feature of the Midlands' trade, and, of course, the newer fibres are in particular demand. There are some attractive knitted fabrics available in a variety of styles, ranging from nylon, spun acetate and "Courtelle." A feature of both the outerwear and underwear fields is the steady return to popularity of cotton.

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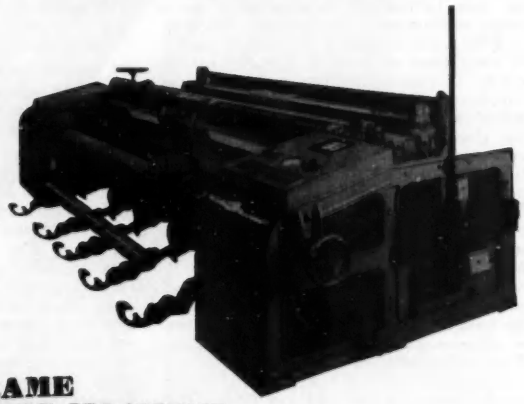

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Notes and News

Outlook for "Wash and Wear" Wool

At the closing session of the Second Quinquennial Wool Textile Research Conference at Harrogate, Dr. A. E. Brown (Harris Research Laboratories, Washington) said: "What wool is facing in the U.S. today, it will be facing in all your countries sooner or later." The ideal wash-and-wear garment, he said, was one which could be worn by fastidious people after washing but without ironing. Good finishes would be achieved only when shrinkage, mussiness and fuzziness were effectively controlled. Standards of the housewife, factory girl, executive, secretary and fashion model would all be different, but there was no reason why they should not be satisfactory to the person concerned.

Wash-and-wear development had grown by leaps and bounds since 1956-57 and many garments now had excellent wash-and-wear properties, while others only attained high standards with ironing. The goal of American scientists was now machine-drying for wash-and-wear wool fabrics. It was now recognised that wash-and-wear shirts, blouses and slacks wrinkled less during wear, and needed less care at the end of the day, and American scientists attached importance to wrinkle resistance. "We are optimistic about the future of wash-wear wool," said Dr. Brown. "Technical factors are favourable for development, and broadening of the fabric range can be accomplished by stabilisation treatments, both chemical and physical, and by fabric construction based on the principles indicated."

* * *

Australian Wool Exports

Australia exported more wool in the ten months ended April than in the comparable period of 1958-59. Figures issued by the National Council of Woolselling Brokers are 1,191,941,000 lbs. compared with 1,057,309,000 lbs. Chief markets were: Japan (273·7 million lbs.) and the U.K. (255·6 million lbs.). Australian top exports during the same period were 18,536,000 lbs., against 16,770,000 lbs. Chief markets were: China (6·4 million lbs.), Korea (3·8 million lbs.) and India (3·0 million lbs.).

* * *

South African Wool Exports

South African raw wool exports during the first nine months of the current season were 20% higher than those during the comparable period a year ago. To the end of March exports totalled 204·2 million lbs., compared with 170·6 million lbs. a year earlier. South African wool top exports were 8·3 million lbs., a gain of 73%.

* * *

Jute Factory in Jamaica

Agreement is reported to have been reached between Ludlow Corporation, Boston, Mass., U.S.A., and Jamaica Industrial Development Corporation, for the erection of a 150,000 sq. ft. factory in Jamaica to employ initially 500 people. An official of J.I.D.C. says their subsidiary company in Jamaica, to be known as Textile Manufacturers Ltd., would buy equipment and plant worth some £700,000, more than half of which will be purchased in the U.K. The Jamaican company is Ludlow Corporation's second overseas subsidiary. The first, located at Calcutta, has been in production some ten years.

* * *

Glass Fibre Fabric Ceiling

To provide a false ceiling and walls at the British Pavilion at the New York Trade Fair the organisers have selected a fabric made from glass fibre which, besides being eminently suitable for curtains and drapes, cannot burn, does not absorb dirt and is easily washed. It is a hard-wearing industrial fabric made by Vetrona Fabrics Ltd., a subsidiary of Tootal Broadhurst Lee Co. Ltd., Sunnyside Mills, Bolton, Lancs. Included in the Pavilion will be other Vetrona glass fibre fabrics, 120 yds. of plain white and 66 yds. of a white marquisette.

* * *

New Vat Printing Dyestuff

QF Durindone Printing Scarlet R Paste is the latest addition to I.C.I. Dyestuffs Division's range of "QF" vat printing pastes. It has very good fastness to light and washing and is recommended for application by the alkali carbonate/sodium sulphoxylate formaldehyde ("all-in") process and by pad-steam techniques, including the "flash-age" process. It is of value for both print-on and discharge styles.

* * *

Bigger Wool Cheques

Australia's wool cheque for the first 10 months of this wool season totalled nearly £240 million. National Council of Wool-Selling Brokers' figures show an increase in sales receipts of about £48 million compared with the same months a year ago. From Pretoria, the South African Wool Board reports that the Union's wool cheque for the past nine months was just over £47 million—£10 million more than for the corresponding period of the previous season. In both countries average prices were advanced on 1958-59 season levels—in Australia, elevenpence more and in South Africa eightpence halfpenny more.

* * *

U.K. Wool Consumption

Wool top production and worsted yarn deliveries in the U.K. in the first quarter of this year set up new post-war records. Total U.K. wool consumption during the same three months reached the second

Textile Specialist Retires

Mr. H. Marsden, technical adviser, Universal Winding Co. (Manchester), now Leesona-Holt Ltd., retired on June 30 after 22 years' service with the company. Well-known throughout the entire industry, Mr. Marsden specialised in the development in this country of high-speed winding, warping and nylon yarn processing techniques. Before he left, his colleagues in Manchester presented him with a travelling case. In this picture he was receiving the gift from Mr. J. A. Nasmith, joint managing director, Leesona-Holt Ltd.

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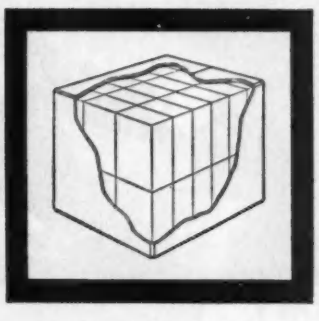

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largest total for any quarter since the war. The Wool Industry Bureau of Statistics reports that wool consumption for the quarter was 137·2 million lb. (clean); a figure only once exceeded—during the 1950 boom. Britain's record top production last quarter was 90·9 million lbs., slightly higher than the previous quarter, which held the record up to that time; and highest-ever worsted yarn deliveries for Jan./Mar. were 64·5 million lbs. Wool cloth deliveries last quarter, while not a record, were among the best of the past three years.

* * *

Cotton Production in China and Russia

A recent circular from the U.S. Dept. of Agriculture states that the aggregate production of cotton in Communist countries—mainly the Soviet Union and Mainland China—is now estimated at 16·3 million bales in 1959-60, or 6% higher than the 15·4 million in 1958-59. As a result of favourable crop conditions in both countries, reports on the harvest indicate larger cotton production than was expected earlier. There was severe drought last summer in some of China's cotton-producing areas but more cotton acreage is now reported to be irrigated and cotton received priorities in the allocation of irrigation water.

* * *

Russian Journals

Scientists and students frequently have difficulty in tracing accessible published Russian literature and, with their needs in mind, a union list has been compiled of Russian scientific and technical periodicals held by the Manchester Central Library, Manchester College of Science and Technology library, Manchester University library and the library of the Royal Technical College, Salford. Altogether, 54 titles are recorded, of which 22 are translations. The list has been compiled for the Library Association (Reference, Special and Information Section, North-Western Group) by Mr. G. Hill (Manchester College of Science and Technology library) and is in alphabetical order of the Russian title. There is a full index under transliterated and translated titles. Miss B. M. Walker, M.A., Central Library, Manchester 2, will gladly send copies to readers of "Textile Manufacturer" who wish to have this useful list.

* * *

Japan's Wool Purchases

Australia's Minister of Trade, Mr. McEwen described Japan's emergence as the greatest single buyer of Australian wool as a spectacular development. Mr. McEwen said that before 1939 Japan purchased 8·2% of Australia's wool exports. In the first ten months of this financial year she had for the first time, displaced Britain as the leading purchaser of Australian wool, taking 20·5% of all Australian wool exports.

* * *

Cotton Goods Sales in South Africa

It is reported by Barclays Bank D.C.O. from South Africa that the increased import duties recently imposed on cheap rayon and cotton materials from the U.K., Japan and other G.A.T.T. countries have resulted in losses to importers, and that the higher prices which must now be charged for these goods will put them out of the reach of lower income groups, particularly the non-Europeans. It is said by the bank that several orders not already shipped have been cancelled, but some concerns have had to accept delivery of material which they might be unable to sell.

* * *

New Appointment

Mr. N. R. Irving resigns his position as promotion manager of British Nylon Spinners on July 22. He is taking up a new appointment as a director of Notley Advertising Ltd. Mr. Irving, who has been fourteen years with B.N.S. has been largely responsible for the company's promotion activities. Among his many valuable services, one which will be remembered by the whole textile industry is the inception and organisation of the first Nylon Trade Fair, five years ago.

* * *

Acrylic Fibre Plant for Yugoslavia

Courtaulds Ltd. and Luna Ltd. (a subsidiary) have entered into a contract with "Acetilen" of Skopje, Invest-Import, Belgrade, and "Vardar" Export-Import, Skopje, whereby Luna will supply plant and machinery for a factory in Yugoslavia to produce acrylic fibre. The value of the contract exceeds £2,000,000. Deliveries of plant will begin next year and the factory will be in operation in 1962.

* * *

New Appointment

M. S. Welling has been appointed sales promotion officer of Bonded Fibre Fabric Ltd., Henrietta House, Henrietta Place, London, W.1, a subsidiary of Courtaulds Ltd. They manufacture a wide range of bonded fabrics under the trade names "Solena" and "Viscotex," used by the clothing industry for interlinings and underskirts. Bonded fabrics also have many other applications, from industrial filters, battery separators and shoe components to dental napkins, surgical dressings and artificial flowers. "Solena" fabrics are claimed to be crush resistant, non-fraying and resistant to dry cleaning solvents. Bonding agents used include natural and synthetic rubbers, vinyl polymers and copolymers and acrylates. Fibres employed are nylon "Terylene," cotton, rayon and acrylic fibres.

* * *

Griffin and George Acquire Instrument Firm

Griffin and George Ltd. have purchased the whole share capital of R. and J. Beck Ltd., one of the oldest-established firms of optical instrument manufacturers in Britain, whose products, particularly microscopes, are renowned for their high technical quality. R. and J. Beck Ltd. operate two works, at Watford and Kentish Town, and have offices and a showroom at Mortimer Street, London, W.1. Amongst the specialities manufactured by them was the new 3-D image microscope, designed by a team at the Cambridge University Psychological Laboratory (see "T.M.," June, page 236).

* * *

Oil Burning Equipment

Hamworthy Engineering Ltd., Poole, Dorset, have purchased Schieldrop and Co., Stotfold, Beds., manufacturers of industrial oil burning equipment for furnaces. The Schieldrop range equipment is complementary to the Hamworthy range and will considerably broaden the base of Hamworthy oil burning interests. Schieldrop and Co. will continue to trade as a separate entity and Hamworthy will mainly supply additional technical and financial support to the Schieldrop organisation.

* * *

"Terylene"/Flax Fabrics

For some years now research and development work on a new blend—"Terylene" and flax—has been carried out jointly by the Linen Industry Research Association and the Fibres Division of I.C.I. Ltd. Spinners, weavers and finishers in Northern Ireland and elsewhere have been actively concerned with the development of fabrics made from this new blend—and the culmination of this work was seen at a recent technical exhibition at the L.I.R.A. Institute at Lambeg. A display comprising nearly 100 "Terylene"/flax fabrics had been arranged, while garments specially made by leading British dress houses were modelled. In addition, technical details covering every aspect of the production of these fabrics were available so that manufacturers could have on the spot answers to their questions. These new blended fabrics combine the advantages of both fibres, and it has been found that this is best achieved with a blend of at least 67% "Terylene" with flax. Traditionally linen fabrics are well known for their coolness and attractive colours, they are absorbent, wash easily and well and resist fluffing. The advantages which "Terylene" brings are excellent crease recovery, abrasion resistance and "minimum care."

* * *

New Silicone Treatment for Fabrics

A new technique for applying efficient silicone proofing to textiles, and new silicones for this work, have been evolved by the Nobel Division of I.C.I. In this system, the product used is a silicone emulsion (EP 277) specially formulated for application to wools, to all fabrics containing wool as a major constituent, and to pure synthetics, by exhaustion technique from winch or washer. After treatment of fabrics the silicone is reported to cure at a lower temperature than hitherto possible, and the water-repellency, as measured by the Bundesmann test, is excellent, with low absorption and zero penetration for most fabrics. Details can be obtained from the nearest I.C.I. Sales Office.

* * *

Cotton and Rayon Merchants Association

Mr. H. B. Harrison, M.C., has been re-elected chairman of the Association, Mr. G. H. K. Rae, deputy chairman, and Mr. R. Rigby, hon. treasurer.

* * *

Change of Address

The head office of Rhodes, Brydon and Youatt Ltd. has now been moved to Reddish Engineering Works, Stockport (Tel No.: Heaton Moor 6211).

* * *

Technical Information

The following publications are now available from I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester.

No. 550—Subject Index to Technical Information Leaflets (Dyehouse) Nos. 161 - 549.

No. 557—The "Felisol" Label.

No. 558—Wool dyes: A new Test for Assessing Level-Dyeing Properties.

GRIPPER

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18" TO 4 YDS.
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★ *High efficiency with proved firm gripper weave.* ✱ *Variable Quality of 4-10 rows per inch.* ✱ *Patent rotary beam for simplified warp Beam replacement.* ★ *Push button all electric control.*

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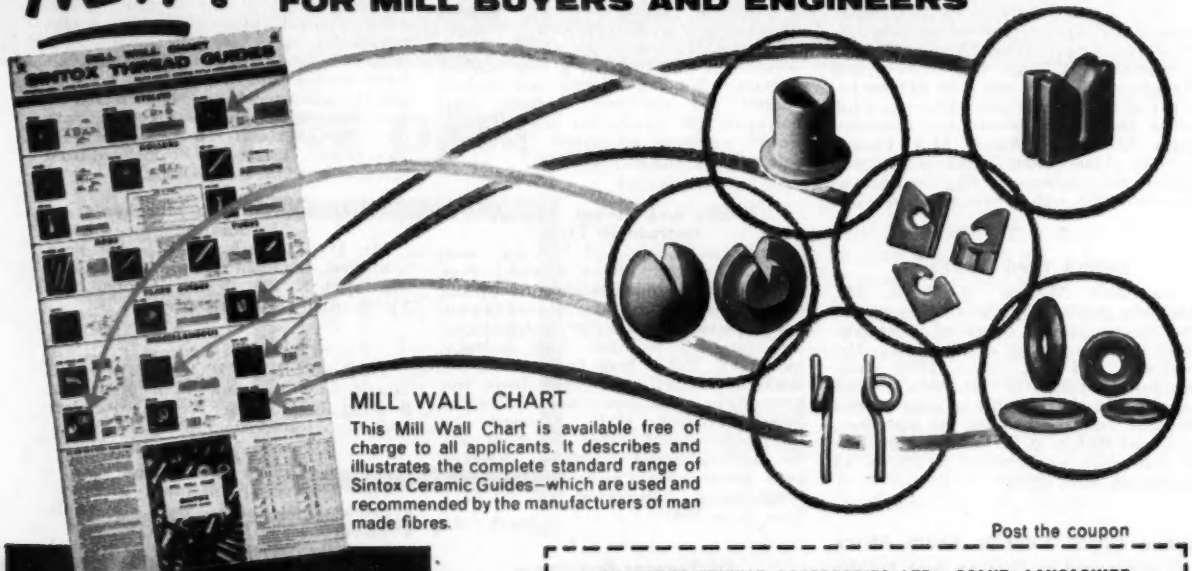
Makers of Looms for over 100 years.

CRABTREE

NEW! CERAMIC GUIDE "STANDARD RANGE" CHART FOR MILL BUYERS AND ENGINEERS



MILL WALL CHART

This Mill Wall Chart is available free of charge to all applicants. It describes and illustrates the complete standard range of Sintox Ceramic Guides—which are used and recommended by the manufacturers of man made fibres.

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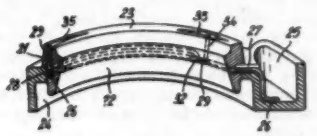
RECENT TEXTILE PATENTS

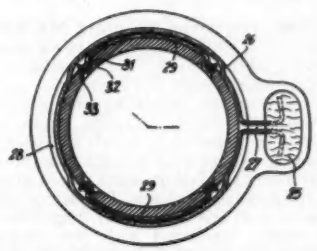
These abridgements are republished from specifications by permission of the Comptroller of H.M. Stationery Office. The full specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2. Price 3s. 6d. each (accompanied by remittance).

814,225 Improved Lubrication for Rings

MANUFACTURE ALSACIENNE DE BROCHES, *Haut-Rhin, France.*

Lubricating arrangements for spinning rings comprises a modification of B.P. No. 764,732. 25 is a ring, having a conical inner track 22 and an upper track 23, for a traveller. The face 22 is flared down and outward from a point adjacent the top side of the ring, while the upper track slopes down and inward. The ring carrier 24 comprises a well 25 containing felt impregnated with a lubricant. The wick 26, which dips into this well, extends through the ring carrier through a notch 27.



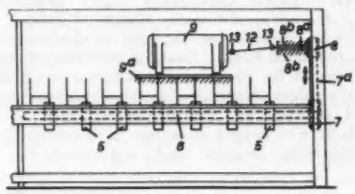


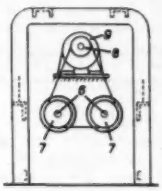
Distributing wicks 29 are also accommodated in the groove 25, in contact with the supply wick. Each of the end portions of each wick 29 passes, first, through a hole 31 which opens on to the inner track into a recess 32 which extends on either side of the hole, then through a hole 33, which brings the end portion of the wick back into the circular groove, and finally through a hole 34 located in the same plane as the hole 33 and which also leads from the circular groove and opens on to the upper track 23, into a recess 35. The end of the distributing wick spreads in this latter recess.

814,267 Improved Drive for Ring Frames

EDMUND HAMEL, *Dahlweg* 102, *Munster/Westfalia, Germany.*

Driving arrangement for opening frame in which the transmission to the individual spindle groups is effected via pulleys 5 which are located on two main shafts 6. Pulleys 7 are mounted on one end of each of the shafts, the pulleys being driven by an endless belt 7*a* passing over a further pulley 8 mounted on a shaft 8*a* carried in a bearing 8*b* given a reciprocating movement indicated by the double arrows, to maintain the tension on the belt as the shafts rise and fall with the spindle rails. The shaft 8*a* is driven from a motor 9, carried on a



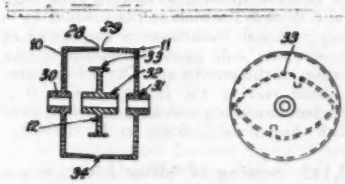


stationary bracket 9*a* mounted within the machine frame. The free end of shaft 8*a* is connected by a universal joint 13 to a cardan shaft 12, the opposite end of which is connected by a second universal joint 13 to the motor spindle. The bearing 8*b* may be mounted to have a vertical reciprocating movement or the inner end of the bearing may be pivoted to allow the pulley 8 to rise or fall about the pivot.

814,293 Traverse Device for Winding Frames

VEB SPINN-UND ZWIRNEREI-MASCHINENBAU KARL-MARX-STADT, 8 *Lächenstrasse, Karl-Marx-Stadt* 31, *Germany.*

A thread traverse device for winding frames which facilitates the winding of conical ended packages. The two cylindrical parts 10 and 11 of the drum are provided with central bosses 30 and 31 and edges 28 and 29 each of which is in a plane inclined to the axis of rotation of the drum, while the core 12 has an approximately ellipse-shaped surface 33 and a



central boss 32. The drum and the core are mounted on a common shaft, the parts 10, 11 being slidable in relation to one another. When mounted in position the parts are spaced to provide a gap 34 between the edges 28, 29. The surface 33 serves as a support for the thread, the thread passing out through gap 34 to the package during winding. The thread tensions occurring due to the lateral shifting of the thread are equalised by the elliptical shape of the part 12.

814,467 Improved Flyers

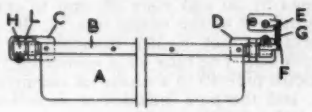
ARUNDEL, COULTHARD AND CO. LTD., *Sovereign Works, Stockport, Cheshire.*

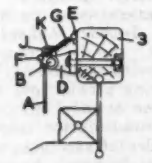
An improvement of the invention described in B.P. No. 746,626. The yarn guide of a flyer is made of wire with its ends pointing in opposite directions to fit in the rolled edge of the metal cap. Its guide portion is made of C or similar form with a double length of wire lying side by side around the C, with one end of the wire pointing in one direction away from the C and the other end pointing in the opposite direction away from the C.

814,629 Improved Shuttle Guard

LINEN INDUSTRY RESEARCH ASSOCIATION, *Lambeg, County Antrim, Northern Ireland.*

A shuttle guard consists of a flat strip of transparent material A attached to a metal bar B which is mounted in bearings C and D on the sley cap 3. A crank pin F is arranged at one end of bar B and is connected by a spring G to a fixed point E on the sley cap 3, the position of the fixed point E being chosen so that the product of the spring tension and the distance of its centre line from the centre of bar B is greater in the working position than in the retracted position. The spring force can be



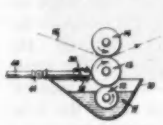


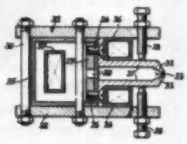
adjusted by altering the angle of the crank F, the crank being held at the required position by means of a screw J in a split boss K on the crank. A stop collar H secured in the same way at the opposite end of bar B has a projecting lug L which bears against the bearing C, and the setting of this collar determines the working position of the guard. The guard A can occupy either of two positions. It can occupy the working position as shown where the transparent strip A is in front of the shuttle with its lower edge close to the cloth. It can also occupy the retrated position in which the lower edge of the guard is folded under the front edge of the sley cap to allow the weaver a clear view of the yarn in the reed and access to it for repairing yarn breaks.

814,769 Dry-Sizing Apparatus

MASCHINENFABRIK RÜTI AG, *Rüti, Zurich, Switzerland.*

Describes apparatus for the dry-sizing of yarns, etc. A trough 10 contains a melted sizing agent 11 and overlying the charging roller 12 is a feed roller 13. The feed roller 13 has a pressure roller 14, and the rollers 12—14 are journalled in a frame. The material 15 is passed between the feed roller and pressure roller whereby the sizing agent is deposited on to the threads. The most important component of the doctor 20 is a nozzle 21 forming between its two lips 22 an air gap 23 directed towards roller 13. The nozzle 21 is located along a square tube 25 and mounted by screws 26 engaging threaded bores of a reinforcement plate 27 arranged





in the tube. The reinforcement plate 27 and the adjoining wall of the tube 25 are provided with several outlets 28 which are distributed over the length of the tube 25 and connect the interior with the interior of nozzle 21. By means of bolts 30 two plates 32 are pressed towards the upper and lower walls of tube 25, and the plates also extend over the nozzle 21. The threaded bores of plates 32 are engaged by set screws 33 which bear at one end from outside on the nozzle 21 and permit of adjusting lips 22 in relation to each other. The nozzle 21 and each of the plates 32 have a heating element 36 between them in the form of a square tube through which hot water or steam may be delivered. A third heating element 37, also in the form of a square tube, is located within the tube 25. Square tube 25 and nozzle 21 are each closed by an end plate 38, and to enable adjustment of the nozzle lips 22, the end plates are not rigidly mounted on the nozzle 21. The tube 25 is connected via a conduit pipe 40 to a source of compressed air, and the pipe includes in its course a control valve 41.

814,839 False-twist Spindles

N.V. ONDERZOEKINGSINSTITUUT RESEARCH, 76 *Velperweg, Arnhem, Holland.*

A false-twist spindle comprises a rotatable tube having secured to its head a device for inserting a twist into a thread. The tube has one or more holes near its head, and the twist device comprises a horizontal cylinder of synthetic sapphire, diamond or agate having a bore at right angles to the axis of rotation of the tube. The upper part of the cylinder wall is free of the tube head, and has a portion of smaller thickness than the remainder of the upper part.

814,981 Improved Hand Looms

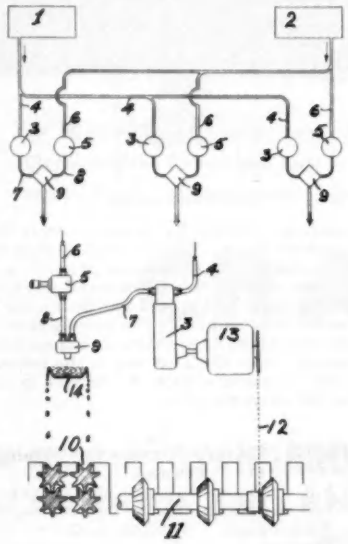
H. F. J. WAREHAM, 3 *The Ridgeway, Marshalswick, St. Albans, Hertfordshire.*

Improved hand looms, which have a quick means for operating roller shuttles through the warp threads to make the work much quicker and easier, and particularly of use for those who are incapacitated. The loom may be mounted on a rocker so that it will rock up and down, and when it is tilted or rocked to one side the shuttle will roll out of the shuttle box on the higher side through the warp to the lower shuttle box, and will roll to the other side when it is rocked in reverse. The loom may be fitted with several quick change shuttle boxes mounted on either side so that several weft colours can be used. In order to simplify the weaving of complicated patterns, it may be fitted similar to that of a foot power loom with lams, the lams may be connected to treadles which would of course not be operated by foot in the present instance.

815,120. Applying Emulsions to Bast Fibres.

D. FRASER AND SONS LTD., *Westbunr Foundry, Arbroath, Angus, Scotland.*

An installation for the application of emulsions to jute, bast, or leaf fibres being treated by processing machines, such as, spreaders, softeners or similar machines. 1 denotes an emulsification plant. 2 a source of supply of water. 3 denotes three metering devices each connected by a

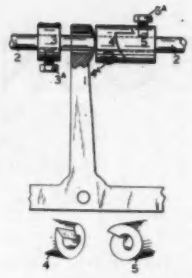


pipe 4 to the plant. 5 denotes three metering devices each connected by a pipe 6 to the water supply. One metering device 3 and one metering device 5 constitutes a group and are each connected, respectively, by pipes 7, 8 to a common mixing device 9 located above a machine 10. The shaft 11 of the machine is connected by a chain 12 to a variable speed gear box 13 connected to the device 3 which is constituted by a pump, so that variations in the speed of the machine will cause variations in the dilution of the emulsion. The oil-in-water emulsion leaving the mixing device 9 is collected in a trough 14 having a weir over which the emulsion flows to the machine.

815,143 Setting of Lifter Mechanism on Spinning, Doubling and similar Machines

W. WHITELEY, *High Gate, Elland,*

Improved lifter mechanism of spinning, doubling and similar machines which provides improved means for enabling ring plates to be vertically adjusted relative to the spindles. The upper end of each of the cranked levers 1 of the lifter mechanism is loosely threaded on the traverse rod 2 with collar 3 secured by set-screw 3A to the rod. Mounted upon the rod at the opposite side of the lever are two bushes 4 and 5,



one end of bush 4 being in engagement with lever 1. The opposite end of the bush has a cam-shaped face meshing with the correspondingly shaped end face of the other bush 5. The bush 4 is locked upon the rod by a screw 4A whose head is recessed into the bush and has a hexagonal recess intended to accommodate the end of an appropriate key. Bush 5 is locked upon the rod by a screw 5A whose head may project from the body of the bush. To adjust the lifter mechanism, bush 4 is unlocked, whereupon the bush may be manually rotated upon the rod, using the key as a lever for this purpose. As the bush is rotated relative to the fixed bush 5 bush 4 will slide to and fro on the rod by virtue of the interacting camshaped faces of the bushes, thereby transmitting a corresponding movement to the cranked lever and consequently to the lifter mechanism and ring plate.

815,649 Improved Winding Machines

VEB SPINN- UND ZWIRNEREIMASCHINENBAU KARL-MARX-STADT, 8 *Lärchenstrasse, Karl-Marx-Stadt* 31, *Germany.*

A device for regulating the pressure between the thread traverse drum and package in winding in which the package holder is mounted for swinging movement away from a fixed drum as the thread wound on the package increases. The device comprises at least one segmentally shaped member rigidly connected with the package holder so as to be movable with it, and a band of friction material passing around the curved periphery of the member. As the package holder moves away from the drum as a result of increase of the package diameter the area of contact between the friction band and the member progressively decreases.

815,932 Improved Drive for Ginning Machines

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A Macarthy gin in which the moving parts receive their driving motion from a shaft mounted exteriorly so as to project inwardly through one side of the machine frame only. The outwardly extending part of the shaft carries pulleys providing driving connections to a source of power, whilst the inwardly extending part of the shaft carries eccentric or equivalent means for oscillating operation of the beater shaft.

816,029 Bobbin Holders

BAHNSON COMPANY, 1001 *South Marshall Street, Winston-Salem, North Carolina, U.S.A.*

A bobbin holder has a bore comprising means for securing a bobbin to the holder. The bobbin securing means includes jaw members adapted to enter within the bore, and resilient means disposed between and engaging the jaw members so as to urge

the members apart whereby the jaws firmly contact the walls of the bore. The resilient means are removable from the jaw members for replacement by resilient means having different characteristics. The jaw members may be depending portions of an inverted generally U-shaped member and the resilient means may comprise an inverted U-shaped spring which is positioned within the inverted U-shaped member so that the outer surfaces of the spring co-operate with the inner surfaces of the jaws.

816,116 Improved Bobbin Strippers

TERRELL MACHINE COMPANY, 3000 *South Boulevard, Charlotte, North Carolina, U.S.A.*

A bobbin stripper machine has handling means for guiding and supporting bobbins by their heads the bobbins travelling in succession along a path. Means for propelling the bobbins along this path comprises an element which is movable along the path. Frame means straddle this path and have mounted on them means for resiliently urging the elements together for gripping the bobbin heads. The frame means are free for movement transversely of the path so that the propelling means is self-centring relative to the guiding means.

816,185 Apparatus for Making Curled Yarn Fabrics

COLLINS AND AIKMAN CORPORATION, 210 *Madison Avenue, New York.*

A method for producing a crimped yarn, comprises tufting a yarn in a backing material to form a tufted pile fabric, subjecting the pile fabric to a setting treatment to set the loops in the tufted yarn, and removing the set yarn from the backing material. The heat-treatment is a moist heat-treatment followed by drying and raveling of the set yarn. The yarn is tufted in the backing material warp-wise, and the tufted pile fabric is subjected to the setting treatment in the warp-wise direction.

816,295 Method of Producing Uniform Scutcher Laps

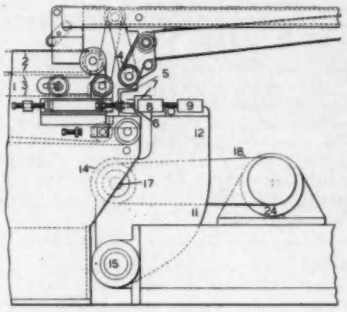
JOH, J. RIETER AND CIE, *Winterthur, Switzerland.*

Method of avoiding a deviation in the weight per metre between the beginning and the end of each lap layer on scutcher-type opener installations. The method comprises continuously adjusting the rate of delivery of the feed member to obtain a fibre layer which, before the layer is wound on to a lap, is of constant thickness. The additional non-linear correction is determined which must be applied to the rate of delivery of the feed member during the winding on to a lap in order to compensate for progressive increase in weight per unit length during winding so as to produce a uniform layer of fibres after such layer has been unrolled again from the lap. One or more laps are then produced with this additional non-linear correction superimposed on the continuous adjustment of the rate of delivery of the feed member.

816,438 Improved Needle Looms

W. BYWATER LTD., *Sweet Street Foundry, Leeds, and* O'BYRNE.

Relates to needle looms, and particularly to the mechanism for operating the needle carrying plate and needles. The machine frame 1 supports a series of endless belts 2, 3, 4 which guide the material down past



a stripper 5 through which the needles 6 operate. The needles are mounted in the plate 7 which is secured to the portion 8 of the needle beam, this portion being carried from the rear portion 9 by four spindles 10 by which the setting of the needles can be adjusted. Portion 9 of the needle beam is secured along the free end 12 of two pivoted arms 11 which are pivoted on a shaft 15. The arms 11 are spaced apart, and through lugs 14 at their mid-portions passes a spindle 17 upon the centre of which is mounted on end of a link 18. The other end of the link is mounted by a two-part flanged sleeve 19*a*, 19*b*, and a roller bearing 20 about an eccentric extension 22 of an eccentric shaft 21 which is supported by roller bearings 23*a*, 23*b*, in a housing 24. Shaft 21 has a sleeve 25 to lock the bearings endwise, and has secured on its end a wheel 26 which is arranged to be driven by a chain 27 from any source of power.

816,546 Spray Dyeing of Fabric

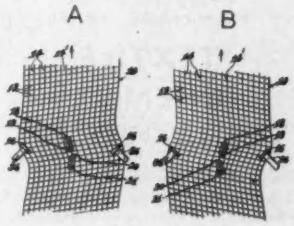
B. THIES, K.G. SPECIALMASCHINENFABRIK, *Coesfeld, Westfalen, Germany.*

A method of dyeing fabrics in which the webs of fabric are suspended in a closed vessel above the level of liquor standing in the bottom of the vessel, and are subjected to a spray of liquor directed down from the top of the vessel. Used liquor is extracted from the bottom of the vessel and recirculated by means of a circulation pump. The delivery of the pump and the design of the spraying means in the top of the vessel must be such as to enable a uniform spray of the liquor to be delivered to all the webs to be treated. The interior of the dyeing vessel may be subjected to over-atmospheric static gas pressure during the dyeing process, enabling dyeing liquor heated to a temperatur of at least 140°C. to be used without risk of failure due to vapourisation.

816,491 Correcting Skew and Bow in Cloths

J. D. ROBERTSON, 2 *Dean Street, Taunton, Bristol, Massachusetts, U.S.A.*

A device which quickly detects any abnormal condition of weft relative to warp of a travelling woven fabric by means of induced distortions of the warp which vary in character whenever there is an existing non-induced abnormal condition of the weft. Any detected abnormality of weft may be utilised to effect a corrective operation of mechanism for restoring the weft to normal. The apparatus comprises web-pulling means arranged to transversely stretch at least a portion of the width of the web by pulling the portion of the web equally in opposite transverse directions at a predetermined location along the path of the web, thereby to provide induced distortions of the warp at the stretched portion of the web. Means near the edges of the web responds to the distortion of the warp and thereby detects any abnormality of weft by the nature of its response. When the weft elements 12 of sheet 10 become skewed, as in A, with their ends which are to the right leading their opposite ends, the pull of the nip-rolls 16 acts to rotate the affected portion of the sheet counter-clockwise and portions of the central warp elements 14_1 assume oblique relationship to the direction of travel of the sheet. If a skew develops in the opposite direction, as represented in B, the nip-rolls



16 rotate the affected portion of the sheet counter-clockwise and portions of the central warp elements 14_1 assume an oblique relationship to the direction of travel of the sheet, and this obliquity is opposite to the obliquity of the portions of central warp elements 14_1 in A. This principle of nip-roll induced stretching of a travelling woven sheet, or of a portion or portions of the width of such a sheet, is utilised to actuate the detector rollers 18, 20 and when the weft elements 12 are skewed or bowed, or otherwise abnormally related to the warp elements, the rollers 18, 20 become differentially actuated to indicate the character of any abnormality of the weft elements, or of roller-engaged portions thereof.

817,298 Water Repellent Compositions for Fibres and Fabrics

P. SPENCE AND SONS LTD., *Widnes, Lancashire*

A water repellent composition for application to fabrics and fibres, comprises a hydrocarbon wax and either the titanium ortho-ester or iso-octanol or reactants from which such ester is derived. In one example, woollen gabardine was immersed in a white spirit solution containing 7% paraffin wax (melting point 120 - 125°F.) plus 1·5% iso-octyl titanate. The fabric was freed from excess solution by hydro-extraction to leave 15% liquid in the cloth, corresponding to approximately 1% wax plus 0·2% iso-octyl titanate on the dry weight of cloth. The cloth was then dried in warm air and steam pressed. When tested according to the methods described in British Standards Handbook No. 11 (1949), page 278, the cloth has a spray rating of 80. When tested according to the method described in British Standards Handbook No. 11 (1956), page 197, the cloth withstood a hydrostatic head of 21·0 cms.

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The position will demand contacts with customers, finishers, and converters, and also Research organisations, etc., and the desirable age range is 30 - 35.

A Company car is provided and an attractive salary will be paid to the successful applicant.

Experience in more than one section of the Textile Industry is essential, and should preferably include weaving and dyeing. Academic qualifications required are a degree in Chemistry or Textile Technology, or equivalent.

The Company's present activities are in textile and industrial uses of Rayon, but will shortly be extended to cover Nylon yarns.

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